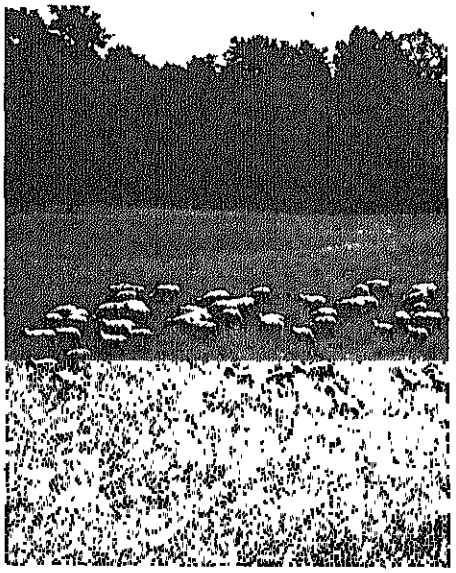
National Range Handbook

Rangeland

Grazable Woodland

Native Pasture



SOIL CONSERVATION SERVICE
US DEPARTMENT OF AGRICULTURE

INITED STATES DEPARTMENT OF AGRICULTURE
OIL CONSERVATION SERVICE
ashington, D. C. 20250

July 13, 1976

IATIONAL RANGE HANDBOOK NOTICE-1

'his notice transmits a complete revision of the National Range andbook. The revised handbook supersedes and replaces the andbook for Range and Related Grazing Lands dated July 1967. t outlines SCS authority, policy, and procedures for range onservation activities.

he procedures outlined (1) reflect the latest concepts in range cience and technology; (2) more fully implement an ecosystems pproach to conservation planning on rangeland, grazable woodland, nd native pasture; and (3) make SCS more responsive to the mul- iple land use needs and interests of land users and decisionmakers.

evisions, deletions, and additions to the handbook issued from the ashington office will be transmitted by serially numbered handbook otices. Revisions will be identified by the notation "NRH Notice o. , (date)" centered at the bottom of each revised page. andbook notices are to be filed in the front of the handbook.

tate conservationists may supplement the instructions in the ational Range Handbook if they feel such supplements are essential or implementing national guidelines. To provide for necessary oordination between states, drafts of proposed state supplements re to be forwarded to the respective technical service center for eview and recommendations. State supplements are to (1) be prepared n colored paper; (2) reference the affected section(s) of the hand- ook; (3) be transmitted by serially numbered handbook notices; 4) include a notation at the bottom of each supplemented page to dentify "NRH Notice No. , (date);" and (5) be inserted at the ppropriate place in the handbook. State handbook notices are to e filed in the front of the handbook.

ıitial distribution of the revised Range Handbook is being made to SC's and state offices only. State conservationists should survey ıeir needs for additional handbooks for area offices, field offices, ersonal copies for SCS employees, and distribution outside SCS. ıdditional copies should be ordered from the Administrative Services ivision, SCS, Washington, D. C. State conservationists are requested o review the handbook with conservation district leaders, range and :her grassland specialists at universities and colleges, and represen- ıtives of other interested federal, state, and local agencies and :ganizations.

Three-ring looseleaf binders and section dividers will be provided for TSC, state, area, and field office file copies of the handbook. Binders and dividers are not to be distributed outside SCS.

R. M. Davis
Administrator

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FOREWORD

The information and guidelines in this handbook constitute basic Soil Conservation Service (SCS) policy and procedures for assisting ranchers, groups, organizations, units of government, and others in planning and applying resource conservation programs on rangeland and other native grazing land.

This revision is based on the same ecological principles as the original handbook (National Handbook for Range and Related Grazing Lands), but the interpretations and applications of these principles have been broadened to meet modern needs.

The handbook supports, supplements, and implements the missions, goals, policies, and procedures of SCS as contained in A Framework Plan; Soil and Water Conservation for a Better America and the National Handbook for Resource Conservation Planning, as they apply to rangeland and other native grazing land.

In the United States, privately controlled native grazing land (rangeland, grazable woodland, and native pasture) totals 517 million acres. This land is unique in its physical and biological characteristics and social impact. Livestock, wildlife, watershed, and recreation are important considerations in planning the use and management of this land.

This handbook deals with the study, inventory, analysis, treatment, and management of the natural resources comprising native grazing land ecosystems. The complexity of native grazing land, the multiple benefits it affords, its interrelationship with forest land and cropland, and its related watershed and wildlife values require an interdisciplinary approach in planning and implementing resource conservation programs.

The criteria and procedures in this handbook are ecosystem oriented, not in a mathematical modeling sense but in an applied sense, with full consideration for:

--Physical environment embracing soils, topography, and climate;

--Biological potential including plants and animals;

--Primary productivity of present and potential plant communities;

--Secondary production from animal populations (wild as well as domestic);

--Alternatives for manipulating vegetation, soils, and animals to reach specific management objectives that will produce the goods and services needed by rural families, communities, and society as a whole;

--Standards for conservation treatment measures to reach management objectives and protect basic resources; and

--Economic considerations.

This handbook was prepared primarily for use by SCS, but others who are interested in resource conservation programs may also find it useful.

R. M. Davis
Administrator

100 SCS AUTHORITY, MISSION, GOALS, POLICIES, AND PERSONNEL FOR NATIVE GRAZING LAND

101 AUTHORITY

The Soil Conservation Act of 1935 provides the basic authority for programs of SCS. This act declares that it is the policy of Congress to control and prevent soil erosion and thereby preserve the natural resources on farm, grazing and forest lands of the nation. It authorizes SCS to carry out conservation measures on the land and to assist land users in conducting conservation activities (Public Law 46, 74th Congress).

SCS responsibility and programs were broadened by the Watershed Protection and Flood Prevention Act, Public Law 566, 1954, as amended; the Great Plains Conservation Program, Public Law 1021, 1956, as amended; and the Food and Agricultural Act of 1962, Public Law 87-703, as amended.

SCS has specific responsibility to assist owners and operators of native grazing land in planning and applying conservation programs on the privately controlled land in their operating units (Amendment No. 4, Title 9, Administrative Regulations, May 17, 1954, and Comptroller General's Opinion B-115665 of October 1, 1953, 33CG:133).

102 SCS MISSION

As stated in A Framework Plan; Soil and Water Conservation for A Better America, the mission of SCS is to assist in the conservation, development, and productive use of the nation's soil, water, and related resources so that all Americans may enjoy:

--Quality in the natural resource base for sustained use;

--Quality in the environment to provide attractive, convenient, and satisfying places to live, work, and play; and

--Quality in the standard of living based on community improvement and adequate income.

103 SCS GOALS FOR NATIVE GRAZING LAND

103.1 Overall Goal

The overall goal of SCS for native grazing land is to manage the land according to quality standards to meet needs for livestock production, watershed protection, wildlife management, recreation, and other uses.

103.2 Specific Goals

(a) Reduce soil and water losses, restore and improve vegetation, wildlife habitat, and water resources and to reduce pollution by applying sound conservation measures.

(b) Maintain a permanent, stable, and productive livestock industry with as efficient use of the forage crop as is consistent with protection of soil resources, permanence of forage production, related uses, and environmental quality standards.

(c) Monitor and evaluate soil losses and plant community changes.

(d) Improve resource inventories for soil and water conservation, livestock production, wildlife management, watershed protection, and recreation.

(e) Further development and use of cost-return data.

(f) Improve understanding and methods of managing ecosystems for multiple benefits.

(g) Improve understanding and methods of evaluating effects of native grazing land management on the critical habitat of threatened and endangered plants and animals.

104 POLICIES

It is the policy of SCS to maintain high standards of technical quality in all activities related to grazing land.

104.1 Resource Inventories

Inventories of native grazing land provide part of the basic information needed by decision-makers in developing sound and practical conservation plans. Ecologically sound inventories are important for understanding resources, properly identifying opportunities, evaluating alternatives, and making wise decisions concerning the use of resources. Resource inventories are also needed as a basis for monitoring changes in the environment.

104.2 Resource Interpretations

Range sites are the interpretive units for rangeland. Primary productivity in kinds, proportions, and amounts (air-dry weight) of plants is the major criterion for identifying and describing range sites. For grazable woodland, the potential to produce vegetation can be interpreted through woodland suitability groups. For native pasture, such interpretations are to be based on an appropriate grouping of soils.

104.3 Technical Guides

State conservationists, assisted by range conservationists and other SCS personnel, prepare and keep current technical guides for native grazing land. These guides contain standards needed to:

(a) Evaluate the potential of rangeland, grazable woodland, and native pasture by identifying and describing range sites and other interpretive groupings.

(b) Determine condition of rangeland in relation to its potential and to assess the forage value rating of the understory vegetation on grazable woodland and native pasture.

(c) Develop sound specifications for conservation practices for rangeland, grazable woodland, and native pasture.

(d) Help users select and apply the conservation practices needed to improve and conserve the soil, water, plant, and wildlife resources of their land for all acceptable uses (CONSERVATION PLANNING MEMORANDUM-2, Rev.).

104.4 Soil Surveys

The National Soils Handbook provides policy and procedures for making soil surveys on rangeland (section 302), making interpretations from soil surveys for potential native plant communities (section 403), and publishing soil surveys (section 603).

The National Handbook for Resource Conservation Planning, section 710.3, outlines procedures for using information about soils in resource conservation planning.

104.5 Interdisciplinary Action

Line officers, range conservationists, agronomists, biologists, foresters, soil scientists, and other specialists work together to provide coordinated guidelines for use and management of native grazing land. Most land has the potential for more than one use, which is best recognized and provided for through interdisciplinary action.

104.6 Technical Assistance

(a) Assistance to users. To achieve the conservation objectives for individual operating units, SCS assists users of native grazing land in developing and implementing their conservation plans on the basis of a scientific inventory of soil, water, plant, and wildlife habitat resources. The objective is to help all users of native grazing land become conservationists. Group planning and application assistance, as well as assistance to communities and units of government, are provided as appropriate to supplement work with individual users of native grazing land (National Handbook for Resource Conservation Planning, section 700).

(b) SCS assistance on Federal land. Under specific circumstances, SCS furnishes technical assistance on Federal land. Such assistance is provided in accordance with agreements with agencies concerned with respective soil and water conservation districts (Comptroller General's Opinion B-115665 of October 1, 1953, 33CG:133, and INTERAGENCY MEMORANDUM-7, Rev.).

(c) Followthrough assistance. This assistance is needed to insure satisfactory progress in implementing conservation plans, especially those relating to grazing management practices. Area and district conservationists assure that enough time is scheduled to provide operators adequate assistance in applying planned conservation practices and in keeping their conservation plans current (National Handbook for Resource Conservation Planning, section 800).

(d) Guidance on stocking rates. SCS is responsible for:

(1) Providing cooperators with information on initial stocking rates applicable to different kinds of grazing land and the current status of the plant cover;

(2) Explaining to cooperators how to use such information to initiate sound grazing management; and

(3) Encouraging cooperators to plan longtime operations based on proper use of forage and to make timely adjustments in grazing use to insure efficient harvest while maintaining or improving the plant community.

(e) Project plans and environmental assessments. Line officers schedule range conservationists to work with planning party leaders to provide native grazing land resource information and interpretations for inclusion in work plans along with other resource information. Appropriate procedures described in this handbook and in Environmental Assessment Procedures are to be used. If procedures are developed on an interagency basis, SCS procedures and standards are to be clearly presented to participating-agency representatives and used to the fullest extent practical.

104.7 Relations

Under the guidance of line officers, range conservationists and other SCS personnel establish and maintain effective working relationships with agencies, organizations, and institutions and help them to understand SCS objectives and procedures. Needed agreements or commitments are made by line officers responsible for the work. Effective relationships with range schools, personnel in other agencies, livestock associations, and soil conservation districts are important in furthering SCS programs dealing with grazing land.

105 PERSONNEL

105.1 Staffing

Policies and procedures for staffing all SCS personnel are contained in SCS memoranda in the PERSONNEL series. Range conservationists and soil conservationists trained in range science are recruited by SCS on the basis of current standards of the Civil Service Commission.

105.2 Career Development

New employees receive individual, group, and on-the-job training. As they gain experience, they have opportunities for additional education, rotating assignments, interstate transfers, and self improvement. Range-educated professionals have opportunities to work as staff range conservationists at field, area, state, regional, and national levels. They also have opportunities to work as line officers at all levels of SCS.

Range conservationists provide staff leadership in assembling native grazing land information relating to all programs for use in and outside SCS. They have opportunities for developing writing and speaking skills necessary for preparing and disseminating technical information. They prepare papers for presentation at scientific, professional, or other meetings; articles for publication in professional journals or popular magazines; and slide shows for use by television and at organized group meetings and schools. Policies and procedures applicable to information activities are contained in SCS memoranda in the INFORMATION series.

200 DEFINITIONS

201 NATIVE GRAZING LAND

Land used primarily for production of native forage plants maintained or manipulated primarily through grazing management. Native grazing land includes rangeland, grazable woodland, and native pasture, individually or collectively.

202 RANGELAND

Land on which the native vegetation (climax or natural potential plant community) is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing use. Rangeland includes natural grassland, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities.

203 GRAZABLE WOODLAND

Forest land that produces, at least periodically, sufficient understory vegetation suitable for forage that can be grazed without significantly impairing wood production and other forest values.

204 NATIVE PASTURE

Land on which the native vegetation (climax or natural potential plant community) is forest but which is used and managed primarily for production of native plants for forage. Native pasture includes cutover forest land and forested areas that were cleared and used as cropland.

205 RANGE

Range includes rangeland, native pasture, and many forest lands that support an understory or periodic cover of vegetation suitable for grazing.

206 RANGE MANAGEMENT

Manipulating the use of native grazing land to maintain its potential for producing forage for livestock and game animals and providing wildlife habitat, water, watershed protection, areas for recreation and esthetic value, and other uses.

207 DECISIONMAKER

An individual, a group of people, a representative of a unit of government, or others representing individuals or organizations authorized to establish policy and ma[illegible] land use and treatment. In this handbook, decis[illegible] owner, and cooperator.

300 RANGELAND RESOURCES AND INVENTORIES

301 GENERAL

Rangeland is important because of its many resources. It is a primary source of forage for domestic livestock. It provides water, wildlife habitat, areas for natural recycling of wastes, and purification of air. In addition, rangeland has esthetic value and provides open space and urban buffer areas.

Rangeland resource inventories are basically "ecosystem inventories." These ecosystems include not only vegetation and soil but also the associated climate, water, and animal life. Ecosystem components, including vegetation, soil, water, air, fire, animals, topography, temperature, solar energy, and man, are closely and completely interrelated. Any influences exerted on one affects the others.

Through the inventories, SCS assists decisionmakers in identifying range sites and in determining the present ecological condition of their rangeland. The inventories also assess such site features as erosion hazard, trend in range condition, present and potential water and wildlife habitat resources, potential for recreation, esthetic quality, watershed or hydrologic conditions, and the presence of fences, roads, and other features important to rangeland conservation planning and use.

302 RANGE SITES

302.1 Definition

A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. A range site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species that differs from that of other range sites in the kind or proportion of species or in total production.

302.2 Using Range Sites to Inventory Rangeland

Range sites are a basic component of rangeland inventories. They are ecological subdivisions into which rangeland is divided for study, evaluation, and management. The range site map provides the basic ecological data for planning the use, development, rehabilitation, and management of rangeland.

Range site information can be interpreted as to suitability of a site for a single use as grazing or for many other uses, such as wildlife habitat, recreation, natural beauty, watershed, and open space.

302.3 Range Sites in Relation to Climax Plant Communities

The natural plant community of a range site in the absence of abnormal disturbances and physical site deterioration is the climax plant community for that site (original and natural potential are acceptable synonyms for climax). It is the total plant community that is best adapted to the unique combination of environmental factors. It should be the plant community that is in dynamic equilibrium with the environment. Such natural disturbances as drought, wild fires, grazing of native fauna, and insects are inherent in the development of any native plant community. Plant communities that are protected from these natural influences for long periods do not always typify the climax vegetation.

The climax plant community of a range site is not a precise assembly of species for which the proportions are the same from place to place or even in the same place from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Variability within reasonable limits is the rule rather than the exception. Boundaries of the communities, however, can be recognized by characteristic patterns of species association and community structure.

Generally, one species or a group of species dominates a site. Their dominance does not vary from place to place or from year to year. Because of their stability in the climax plant community, they can be used to identify sites and to differentiate one site from another. Accessory or invading species, however, fluctuate greatly according to local differences in

302.3 Continued

microenvironment or weather conditions. Consequently, using them for site identification ca be misleading.

Climax plant communities change along environmental gradients. Where changes in soils, topo graphy, or moisture conditions are abrupt, plant community boundaries are distinct. Boundaries are broader and less distinct where plant communities change gradually along broad environmental gradients of relatively uniform soils and topography. The important considera tion is that, even though plant communities tend to be alined along a continuum, distinctive plant communities can be identified and described. These communities occur with predictable regularity and are associated with concurrent differences in soil, topography, or climate that can also be recognized.

A range site is recognized and described on the basis of the climax plant community it is ca ble of supporting. However, the goal of use and management is not necessarily to restore or maintain such a plant community. The goal may be a somewhat altered plant community, one th provides adequate soil and moisture conservation, yet produces benefits that are more useful to the objectives of the decisionmaker than the climax vegetation.

302.4 Determining the Climax Plant Community of a Range Site

The following methods are used in determining the climax plant community of a range site:

(a) Evaluation of relict vegetation and associated soils on areas that have been subjected to minimal abnormal disturbances. Both the productivity and the species composition of the plant community should be evaluated (section 600).

(b) Interpolation and extrapolation of plant, soil, and climatic data from existing relict areas along a continuum to other points on that continuum for which no suitable relict is available.

(c) Evaluation and comparison of areas currently grazed in varying degrees and comparison of such areas with similar areas that are not grazed. When the response to grazing of important plant species is projected in relation to each other, certain valid characteristics of climax plant communities can be deduced.

(d) Evaluation and interpretation of research data dealing with the ecology, management, an soils of plant communities.

(e) Review of early historical accounts and botanical literature of the area.

The SCS Range Data System (RDS) will provide much data useful in identifying climax plant communities (section 700).

Characteristics of a plant community obtained from a single source are not likely to be conclusive. In evaluating plant information, consideration must be given to such factors as drought versus unusually favorable years, effects of recent fire, excessive rodent concentrations or insect damage, plant disease, or excessive soil removal or deposition by wind or water. Every effort should be made to examine plant communities throughout the area of occurrence of the range site and at different seasons and during different years. The initial description of a climax plant community should be considered as an approximation subject to modification as additional knowledge is gained.

302.5 Permanence of Range Sites

Range sites are subject to many influences that modify or even temporarily destroy vegetatior but do not necessarily preclude recovery or reestablishment of a climax plant community. Examples of such influences are drought, grazing, fire, and even short-term tillage. Unless particularly severe, their effect usually can be corrected over a period of time by management or special treatment and the potential of the range site is not permanently affected.

Some range sites are more fragile than others and do not respond readily to improved management. For example, range sites associated with shallow soils and steep slopes or in areas of persistent winds or low precipitation may be seriously and permanently damaged by disturbances that would not seriously affect more stable sites.

302.5 Continued

Deterioration of the plant community is often followed by loss of soil and soil fertility, loss of ability of a soil to absorb and retain water, increase of stones on the surface, soil crusting, and other forms of site deterioration. The cumulative effect of such detrimental influences reduces the opportunities for reestablishing the original cover and productive capacity of the range site. Severe site deterioration may permanently alter the potential of the site. Examples include permanently lowering the water table, severe surface drainage caused by gullying, and severe erosion by wind or water. A different site is then recognized and described on the basis of its altered potential.

302.6 Differentiations Between Range Sites

The criteria used to differentiate one range site from another are:

(a) Significant differences in the species or species groups that are ecological dominants in the plant community.

(b) Significant differences in the proportion of species or species groups that are the ecological dominants of the plant community.

(c) Significant differences in the total annual production of the plant community.

Any differences in criteria (a, b, and c), either singly or in combination, great enough to indicate a different use potential or to require different management, such as changes in grazing systems, season of use, or different stocking rate, are basis for establishing a range site.

Differences in kind, proportion, and production of plants are in large measure the result of differences in soil, topography, climate, and other environmental factors. Variations in these factors are not criteria for site differentiation, although individual environmental factors are frequently associated with significant differences in native plant communities. Some of these differences are obvious. The presence or absence of a water table within the root zone or the occurrence of highly saline soil contrasted to nonsaline soil is dramatically reflected in plant communities that such soils support. Marked changes in soil texture, depth, and topographic position usually result in pronounced differences in plant communities. Therefore, such contrasting environmental conditions known to be associated with a specific range site can be used as a means of identifying the site in the absence of the original native vegetation.

Making distinctions between range sites along a continuum is difficult because changes in the plant community are gradual. Thus, the need for site differentiation may not be readily apparent until the cumulative impact of soil and climatic differences on vegetation is examined over a broad area. Frequently, such differences are reflected first in production and second in the kinds and proportion of the plant species making up the core of the plant community. Of necessity, boundaries between range sites along a continuum of closely related soils and a gradually changing climate are somewhat arbitrary.

The effect of any single environmental factor can vary, depending on the influence of other factors. For example, a deep soil is more significant on a range site that receives additional moisture from repeated overflow than on a sloping upland site that receives no overflow. An additional two inches of annual rainfall may be highly important in a section of the country that has an arid climate but of minor significance in one that has a humid climate. A difference in average annual production of 100 pounds per acre, air-dry weight, is of minor importance on range sites capable of producing 2,000 pounds per acre. This difference, however, is highly significant on sites capable of producing only 200 to 300 pounds per acre. Similar variations in degree of significance apply to most factors of the environment. Consequently, in identifying a range site consideration must be given to its total environment as well as to the individual components.

In evaluating the significance of kinds and proportion of species or species groups that are dominant in a climax plant community, the relative importance of species may indicate whether one or more range sites are involved. For example, on one range area the original native vegetation may consist of 60 percent big bluestem and 10 percent little bluestem, and on another area it may consist of 60 percent little bluestem and 10 percent big bluestem. Grazing management should be based mainly on the requirements of big bluestem on the first area and on those of little bluestem on the second. Thus, two range sites are recognized, even though the difference in total annual production may be relatively minor.

302.6 Continued

Range sites are not differentiated on factors that can influence grazing distribution and accessibility but have little or no direct effect on the nature of the climax plant community.

302.7 Assembly of Range Site Data

To evaluate plant communities and to make meaningful distinctions between range sites, the data collected at each location must be recorded in an orderly manner. Complete data on species, composition, production, soils, topography, climate, and other pertinent factors should be recorded carefully. Using "plant association tables" (exhibits 302.7A and 302.7B) to assemble these data makes it possible to readily identify the important similarities and differences. Exhibit 302.7A is simply a recording of production and composition data from sample locations that includes four identified soils on which the plant community was judged to be climax. Exhibit 302.7B illustrates the means by which these data are used to group similar plant communities into range sites. It also illustrates that composition and production of the climax plant community on one soil is consistantly comparable and that different soils can be grouped into a single range site. The occurrence in three plant communities of Idaho fescue, a significant difference in forb and shrub components, and a significant difference in production indicate there are two different sites.

302.8 Naming and Correlating Range Sites

The demand for broader interpretation of rangeland resources, the increasing uses to which range site information is being applied, the Range Data System, and computerized programs for soil classification have created a need for a standardized system of naming or numbering range sites.

Until a more comprehensive system for naming and coordinating range sites is developed, the guidelines are:

(a) Naming range sites. Range sites are named to help users recognize and remember the significant kinds of rangeland in their locality. Names of range sites should be brief and should be based on such readily recognized permanent physical features as the kinds of soil, climate, topography, or a combination of these features. Some examples of range site names based on these criteria are Deep Sand, Sandy, Sandy Plains, Silty, Clay Upland, Saline Lowland, Gravelly Outwash, Pumice Hills, Subirrigated, Wet Meadows, Fresh Marsh, and Sandy Savanna.

Names depicting land forms and using physiographic features that are complexes of range sites should not be used.

not automatically delineate two range sites. Likewise, some soil taxonomic units occur over broad environmental gradients and may support more than one distinctive climax plant community brought about by other influences such as an increase or decrease in average annual precipitation.

Only one name should be given to a single site that occurs in adjacent states or MLRA's. If this is not feasible, use the local name in the description of the range site and indicate the name used in the adjacent state or MLRA.

302.9 Range Site Descriptions

A technical description is to be prepared for each range site that is identified and named (exhibits 302.9A and 302.9B). Descriptions should be brief, but they should clearly present the features that characterize the site. They are not to be oriented solely around livestock grazing. Other resources of the site may be highly significant in planning, developing, managing, and monitoring rangeland resources. Descriptions should include the following, as appropriate, along with other pertinent information:

(a) Full name. The full name of the site should be placed on each page of the description.

(b) Physiographic features.

(1) Occurrence of site in the landscape, e.g., on ridgetops, in swales, on south-facing slopes. Special notations should be made concerning susceptibility to run-on and overflow, depth of water table, and similar characteristics.

(2) Degree and direction of slopes.

(3) Range in elevation.

(c) Climatic features.

(1) Range in average annual precipitation and its seasonal distribution.

(2) Average beginning and ending dates of growing season for major native forage species and also temperature characteristics.

(3) Other such features as storm intensity, wind velocity, and drought cycles that typify site and relate to its potential.

Climatic information can be included in the description of the site (exhibit 302.9A) or it can be prepared for a field office of other logical geographical area. If the information is not included in the description of the site, include a reference to where it can be found (exhibit 302.9B).

(d) Climax vegetation.

(1) Briefly describe the structure and appearance of the climax plant community.

(2) List the major plant species and their normal relative proportion in the total plant community.

(3) List tree species and give the approximate overstory canopy and site index if significant.

(4) Describe the approximate ground cover or plant spacing if significant.

(5) Briefly describe the common pattern of retrogression and list plant species that are most likely to invade if cover deteriorates.

(e) Total annual production. Show total annual production as median air-dry production and the fluctuations to be expected during favorable and unfavorable years. In areas where examples of the climax plant community are not available, cite the production of the highest range condition class for which examples are available.

302.9 Continued

(f) Soils.

(1) Briefly describe the main properties of the major soils associated with the site. Give special attention to properties that significantly affect plant, soil, and water relationships.

(2) Name the major soils associated with the site. If many soil names are subject to change, list the soil taxonomic units associated with the site on a separate sheet that can be easily updated.

(g) Site interpretations. Site interpretations give the potential importance of the site for each of its major uses, including grazing, habitat for wildlife, recreation, natural beauty, and watershed quality. Note the kinds and classes of livestock and seasons of grazing to which the site is best suited. List wildlife species that inhabit the area, along with the important food and habitat plants for each major species. Note the relative stability of the site for watershed quality. List threatened and endangered species of plants and animals. Indicate the plant species that have special esthetic or landscaping value.

(h) Other information. Other pertinent, interpretive, and descriptive information may be included. This information can consist of forage preference and quality ratings of plant species for different kinds of animals, as well as guides to initial stocking rates.

(i) Identification and authentication data.

(1) Identify with USDA and SCS.

(2) Give location of a typical example of the site.

(3) Identify site with the land resource area(s), state(s), area(s), and/or field offices in which it occurs.

(4) Show, on the first page, the date on which the description was approved for use and the name or initials of the approving person. Site descriptions must be approved by the state range conservationist or by other state employees assigned statewide leadership for range conservation activities. The range conservationist assigned to the technical service center must review and comment on all site descriptions prior to their approval.

303 RANGE SITES AND SOIL SURVEYS

It is SCS policy to make soil surveys to collect essential soil information for use in conservation planning, development, and management; for other uses of soil maps; and to meet the requirements of the National Cooperative Soil Survey (see National Soils Handbook, section 201).

Soil scientists and range conservationists must work as a team to: develop soil survey work plans; determine the composition of soil mapping units and prepare map legends; agree on the intensity of mapping; and conduct field reviews. Close cooperation and skillful planning are necessary to insure maximum use of soil surveys for making proper resource interpretations. The National Soils Handbook, section 201, establishes responsibility for planning soil surveys on rangeland. Section 405 outlines responsibility for coordinating and testing soil survey interpretations.

303.1 Using Soil Surveys to Identify Range Sites

In areas where soil surveys are completed and range site interpretations have been made, boundaries of range sites should be determined directly from the soil map. Such boundaries can be outlined on the soil map or they can be transferred to other maps. These boundaries can be verified in the field during planning.

303.2 Soil Interpretations for Range Use in Published Soil Surveys

Sections 403 and 603 of the National Soils Handbook establish SCS policy and procedures for preparing soil interpretations for rangeland. Sections 603 and 604 outline policy and procedure for publishing soil surveys and preparing interim soil reports.

304 MAPPING RANGE SITES

304.1 Delineation of Range Sites

Range sites are delineated on conservation plan maps, or as described in 303.1, to provide a record of this part of the rangeland resource inventory for conservation planning, for subsequent evaluation and revision or updating of management plans, and as a basis for evaluating the effectiveness of management and practices applied. Boundaries of range sites are shown on maps by solid lines.

Within a specific area of rangeland, range sites can be delineated on maps as predominantly a single site, with or without inclusions of small areas of other sites, or as a complex of two or more sites that are so interspersed that separate delineation would not be practical or meaningful.

The names of range sites are generally shown on the map within each delineation, but if space is limited, the names can be represented by appropriate symbols explained in a legend. If a delineation represents a single site or a major site that has minor inclusions of other sites (making up as much as 15 percent of the site), the name of the major site is used. If a delineation represents more than one site, the name of each major site and the approximate proportion of each is indicated. For example, Loamy Upland, 65 percent; Shallow Loam, 35 percent.

It is impractical to establish a uniform minimum acreage for site delineations. Need for mapping detail varies in accordance with relative productivity of a site, size of management unit, map scale, size of ranching unit, and intensity of grazing patterns. Rangeland that has relatively high productivity is usually mapped in greater detail than that of low productivity. Land that is suitable for many alternative uses is also mapped in more detail.

Intensity and detail in mapping range sites, therefore, are determined locally on the basis of the kinds of rangeland and the needs for conservation planning. Major consideration is given to the management needs for various uses of the rangeland, including livestock grazing, habitat for wildlife, and watershed protection.

304.2 Small Irregular Areas of Rangeland

Small irregular areas of rangeland that are fenced in with cropland are to be indicated on the conservation plan map as rangeland. Range site or range condition of such areas need not be indicated on the map if space is limited. These small tracts are usually grazed intermittently along with crop residues or when the field is used for winter feeding. Section 710.312 (8) of the National Handbook for Resource Conservation Planning states that if rangeland is intermingled with other kinds of land, the range site and the range condition can be delineated on the soil map and explained in the legend of the map.

305 RANGE CONDITION

305.1 Criteria

SCS range site and condition criteria are based on an objective ecological approach. To maintain this approach, the following points must be recognized:

(a) Each species of a climax plant community has its ecological niche and inherent functions in that community.

(b) Range sites are differentiated on the basis of significant differences in kind, proportion, or amount of plant species in the plant community, regardless of their value for any specific purpose.

(c) Range condition is determined by comparing existing plant communities with the presumed climax plant community for a specific range site, regardless of the value of individual plants or the plant community for specific uses.

(d) Departures from climax, which can result from many causes, can enhance or depreciate the value of the resultant plant community for various uses.

305.1 Continued

(e) Determining range site and range condition does not automatically establish grazing value. Grazing values of range sites and range condition classes must be established for management units by evaluating the results of actual grazing use.

(f) If grazing of the climax plant community on a specific range site is constantly subjected to moderately heavy use, the response of individual plant species depends on the kind of grazing animal and the season of use. A species that decreases if a range is grazed by cattle in spring may increase if the range is grazed by deer or by sheep.

(g) An abnormal amount of any species, compared with the amount in the climax, represents a change in range condition, regardless of the value of the species for any specific use.

305.2 Definition of Range Condition

Range condition is the present state of vegetation of a range site in relation to the climax (natural potential) plant community for that site. It is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site. Range condition is basically an ecological rating of the plant community. Air-dry weight is the unit of measure used in comparing the composition and production of the present plant community with that of the climax community.

305.3 Purpose of Determining Range Condition

The primary purpose of determining range condition is to provide a basis for predicting the extent and direction of changes that can result in the plant community because of specific treatment or management. The range site indicates the potential; range condition represents a starting point for management toward the potential or toward the objective selected by the decisionmaker.

305.4 Guide for Rating Range Condition

A guide for rating range condition is required for each range site. This guide can be prepared separately or the information can be included in the part of the range site description that lists the major plant species.

The guide should list the common species in the climax plant community for the site and the amount of each species considered characteristic for the site. The amount of each species can be expressed in pounds per acre (lb/acre) or as a percentage of the total production of the plant community. Guides that indicate both production in air-dry weight and percentage of composition of individual plant species are more versatile than guides that show only one quantitative value. Range condition guides should bear the date of preparation or the most recent date of revision. Exhibit 305.4 is a sample range condition guide.

305.5 Determining Range Condition

The range condition of areas within a range site is determined by comparing the present plant community with that of the climax plant community, as indicated by the range condition guide for the site.

For the existing plant community, count as climax no more than the maximum weight (or percentage of total production) shown on the guide for any species in the climax plant community.

The amount of all climax species not in excess of that shown on the guide is totaled to indicate the relative ecological rating or numerical evaluation of the stand. The rating will be between 0 and 100, depending on how closely the plant community resembles the climax plant community for the range site.

(a) Range condition class. Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax. They are:

Range condition class	Percentage of present plant community that is climax for the range site
Excellent	76-100
Good	51-75
Fair	26-50
Poor	0-25

305.5(a) Continued

Guides based on the weight of species in the climax plant community give a true expression of ecological condition. A condition rating based on the percentage of composition alone may need adjustment if the total production is less than that characteristic for the condition class. For example, a rating determined by counting the percentage of each climax species may indicate that the existing plant community is in near-climax condition, but the production of these species is less than that expected for near-climax condition. The condition rating should therefore be lowered, giving due consideration to the current growing conditions. (Document the reason for lowering the condition class on the inventory worksheet.)

(b) Worksheet for use in determining range condition. If possible, conservationists should determine range condition on the site with the operator. If this is impossible, conservationists should review the range condition inventory with the operator on the site in enough detail to insure that he fully understands it. A worksheet for this purpose helps the operator to evaluate his plant communities and also serves as a record. Completed copies can be left with the operator or placed in his conservation plan folder. Completed worksheets are of value in monitoring changes or in evaluating the effectiveness of management practices during subsequent evaluations of the same area.

Exhibit 305.5 is an example of a range condition worksheet. The status of each species in the natural plant community is expressed in pounds per acre, air-dry weight.

305.6 Productivity Rating Index for Climax Species

In addition to indicating the productivity of individual climax plant species on range condition guides, a simple index to the relative importance of the species in the climax plant community is often useful. This index can be included on the condition guide (exhibit 305.4), on a separate sheet, or on a spread sheet that provides for several range sites.

The following criteria should be used in preparing a productivity rating index for climax plants:

Importance of species	Productivity rating
Always present, makes up more than 50 percent of total annual production	1
Always present, makes up 25 to 50 percent of total annual production	2
Generally present, makes up 10 to 24 percent of total annual production	3
Frequently present, makes up 5 to 9 percent of total annual production	4
Occasionally present, makes up less than 5 percent of total annual production	5

305.7 Dynamics of Range Condition

Plant communities are dynamic. They are ever responding to changes in their environment, to their use, and to stresses to which they are subject. Species change in proportion and amount in the plant community. Climatic cycles, fire, insects, grazing, and physical disturbances are some of the many causes of changes in plant communities. Some changes, such as those resulting from seasonal drought or short-term heavy grazing, are temporary. Other changes are long lasting.

Individual species or groups of species in the plant community respond in a different manner or degree to the same use or stress. All species in a native plant community are seldom equally palatable to grazing animals. Unless grazing is extremely heavy, some plants are cropped more closely and frequently than others. Most plants are sensitive to stress during some period or stage of growth. They may be severely affected by moderate grazing during short but critical growth periods but tolerant of much heavier use during other times.

Many plants respond to changes in the microenvironment independently of grazing. The response

of some species depends on what happens to their associated species. Some kinds of plants are destroyed by fire, but others thrive and grow quickly following a fire. The same weather conditions may favor the growth of one species in a plant community but be unfavorable for another in the same plant community. A growing season in which frequent light showers occur, for example, may be ideal for shallow-rooted species but not for associated deep-rooted species, which depend upon deep soil moisture. Thus, many complex factors contribute to changes in the composition of plant communities. Not all changes are related to grazing by livestock.

Plants are sometimes grouped or classed on the basis of their response to specific kinds of stress. For example, climax plants that respond quickly to continued grazing misuse by decreasing are called decreasers. Species that respond to misuse, at least initially, by increasing in relation to other plants in the community are called increasers. Under certain kinds of disturbance, plants that are not a part of the original plant community invade and may become prominent and persistent. These plants are called invaders.

Inasmuch as plants do not always respond in the same manner to different influences, a species may be a decreaser on some range sites but an increaser or an invader on other sites. Even on the same range site, a species may be a decreaser if regularly grazed during one season but an increaser if grazed at a different time. Similar responses may result if plants are grazed by different kinds of animals during the same season.

The terms decreaser, increaser, and invader are often incorrectly used synonymously with good, fair, and poor when describing the forage value or preference of forage plants. There is a persistent tendency to regard plants that have low grazing value or that are undesirable for other reasons as invaders, even when they are valid climax species.

The system of classifying plants as decreasers, increasers, and invaders is sometimes useful in explaining the species changes that take place in plant communities and in predicting changes likely to take place under alternative resource uses. Such classification, however, is not to be used as a criterion for determining present range condition. Exhibit 305.4 illustrates an interpretation of plant response to grazing by different animals. A similar format can be used for showing plant response to grazing during different seasons.

305.8 Revising Range Condition Guides

Range condition guides are to be revised, modified, or updated as additional data concerning climax plant communities become available. If modifications are minor, pen-and-ink changes can be made on existing guides. The date of revision should be indicated. Changes in range condition guides usually are needed if:

(a) Additional production data have been collected and documented.

(b) Proficiency in estimating production and species composition has increased.

(c) Additional information has been made available through the Range Data System (see section 700).

305.9 Mapping Range Condition

(a) Boundaries of range condition. Range condition boundaries within range sites are to be shown on maps by dotted lines. Ecological range condition within such delineations are to be designated by numerical ratings, by range condition classes, or by appropriate symbols that are explained in the legend for the map.

(b) Mapping seeded areas. Areas of rangeland that are seeded to native or adapted species are to be delineated on maps by dashes and labeled "seeded." The names of principal seeded species and an indication of the stand or ground cover can also be shown. Range condition is not determined for such areas, unless seedings of native species develop characteristics of the native plant community for the site.

306 EVALUATING PLANT COMMUNITIES ON ANNUAL RANGES

In some situations conventional ecological procedures for evaluating plant communities do not result in meaningful rangeland resource information. Special provisions are made for "annual ranges."

306 Continued

Over some rather extensive rangeland areas, especially in a Mediterranean-type climate, the original native perennial plant communities have, for the most part, been replaced by communities of annual plants. In many places these annual plants produce useful forage and effective cover. The goal of management for such areas may be to maintain or improve the present cover of annuals, rather than to encourage secondary plant succession toward the climax community.

Range condition classification based on the native climax plant community obviously has little value if the community consists largely of annuals or of introduced species. These species have different values for forage and for other uses, however, and a means of evaluating them is needed as a basis for establishing management and treatment objectives.

Guides to plant cover values should be prepared. Consideration is to be given to both the quality and the productivity of the species. Such terms as desirable, less desirable, and undesirable; high, medium, and low; or primary, secondary, and low can be used to rate present values and to decide the changes in composition, if any, that are desirable. The proportion of plants in each category and their productivity are factors to consider in developing a value rating. These ratings should not be confused with those of range condition.

Although special prodedures are needed for evaluating the plant cover on "annual range," range sites should still be identified and described on the basis of the potential plant communities they support. Information about the common annual plant communities should be included in the description of the range site.

307 TREND IN RANGE CONDITION

A correct interpretation of trend, the direction of change in range condition, is one of the most important parts of a rangeland resource inventory. The present ecological range condition rating alone does not indicate whether the plant community is improving or deteriorating in relation to its potential. Trend is a separate determination that is necessary for assessing what is currently happening to the plant community. The present range condition is a result of a sustained trend over a period of time. Trend is a much more sensitive indicator of change than condition. It is important to know the trend when planning the grazing use, management, and treatment needed to maintain or to improve the resource. It is also important to consider the trend when making adjustments in grazing systems. Some characteristics of vegetation and soil that indicate apparent trend in range condition are discussed in the paragraphs that follow.

307.1 Composition Changes

The native plant community, which represents the potential for a range site, is relatively stable, but it is in no sense static. Major changes in the plant composition do not occur, however, unless induced by pronounced disturbances, such as continued close grazing, severe or prolonged drought, or repeated burning. If range condition is declining as a result of continued close grazing, the perennial species most sensitive to damage by grazing decrease. An increase in species of low grazing preference usually indicates a trend toward lower condition, except in areas where the plant cover has been severely depleted and increases of even low-quality plants indicate improvement.

When disturbances that cause a decline in range condition are corrected, secondary plant succession operates to reestablish the climax plant community for a site. Plants that have declined in amount because of past misuse will increase in time if seed or vegetative parts are still available. In varying degrees, plants that have increased as a result of declining range condition now tend to decrease because of competition with newly reestablished species. Once established, certain woody and some other long-lived perennial plants may persist for a long time.

The invasion of plants not native to the site indicates a decline in ecological range condition. Such plants may flourish temporarily on localized disturbed areas, however, when the site as a whole is in excellent condition. In addition, some invaders, particularly annuals, may flourish temporarily in favorable years, even when range condition is improving. A significant, though temporary, increase in annuals and short-lived perennials may also occur during a series of wet years, even though the general trend in condition is upward.

307.1 Continued

Changes in plant composition, whether from declining or improving range condition, generally follow a pattern. All changes in amount of species are not predictable, but successional patterns for specific sites, climates, and grazing use can be predicted.

307.2 Abundance of Seedlings and Young Plants

Changes in a plant community largely depend on successful reproduction of the individual plants on the site. Successful reproduction is evidenced by young seedlings, plants of various ages, and spread by tillers, rhizomes, stolons, and similar methods of propagation. The extent to which any of these types of reproduction occurs varies according to the growth habits of the individual species, site characteristics, current growing conditions, and use to which the plant is subject.

Except in areas of near-climax condition where it is difficult for seedlings to become established, the age-class distribution of plants is an important indicator of changes in the plant community. If all the plants of an important species attractive to grazing animals are old or decadent, the species is declining in amount. A significant number of seedlings and young plants of this species, however, usually indicates an improving trend.

307.3 Plant Residues

The extent to which plant residues accumulate depends primarily on the production level of the plant community; the amount of plant growth removed by grazing, haying, fire, insects, wind, or water; and the amount of plant growth decomposed in place. In hot and humid climates, the rate of decomposition of plant residues may be so great that there is little or no net accumulation. Conversely, in cold climates decomposition is slow. In using plant residues to judge trend in range condition, careful consideration should be given to the level of accumulation that can be expected for the specific range site, plant species, and climate.

Excessive grazing, below-normal production, recent fires, and abnormal losses caused by wind or water erosion may result in an accumulation of plant residues below that considered reasonable for the site. In the absence of these factors, progressive accumulation of plant residues usually indicates improving range condition. Residues, however, may accumulate rapidly for some kinds of plants, especially woody species or annuals, when they exceed the characteristic amount for the climax plant community. Such accumulations of residues are not an indication of improving range condition.

307.4 Plant Vigor

Plant vigor is reflected primarily by the size of a plant and its parts in relation to its age and the environment in which it is growing. Many plants that form bunches or tufts in a vigorous condition may assume a sod form if their vigor is reduced. Length of rhizomes or stolons is also a good indication of the vigor of a parent plant; these parts are usually fewer and shorter if a plant is in a weakened condition. An increase in the vigor of major forage species and other plants that are highly preferred by grazing animals usually indicates improving range condition.

307.5 Condition of the Soil Surface

Unfavorable conditions of the soil surface may significantly affect trend in range condition. If plants and plant residues are lacking on the surface of the soil, splash erosion and crusting occur.

Crusting impedes water intake, inhibits seedling establishment and vegetative propagation, and induces high surface temperatures. These conditions, in turn, increase rates of water runoff and soil loss; reduce effective soil moisture; and generally result in unfavorable plant, soil, and water relationships. Improvement in the plant cover following good management is delayed if such soil conditions exist. Bare ground, soil crusting, stone cover, compaction from trampling, plant hummocking, or soil movement may indicate a trend in range condition. These indicators, however, are often misleading. Most of them occur naturally under certain circumstances. For example, plant hummocking is natural on silty soils that are subject to frost heaving. Some range sites do not support a complete plant cover. Bare ground, crusting, stones on the soil surface, and localized soil movement may be completely normal. Even when induced by misuse, the soil surface trend indicators are not nearly as sensitive as those of changes in the plant cover.

307.5 Continued

Soil changes always lag plant changes, whether condition is improving or declining. Severe changes in soil surface conditions are positive indicators of past misuse but to wait for these factors to appear is to conduct a post mortem evaluation.

The relative importance of the trend factors discussed vary in accordance with differences in vegetation, soils, and climate. Evaluating any one on a range site may indicate whether range condition is improving or declining. A more sound evaluation of trend, however, can be ascertained if all or several of the factors are considered in their proper relation to each other.

308 INITIAL STOCKING RATES

Approximate stocking rates vary for different range sites and range conditions within range sites because of variation in kind, proportion, and production of plant species. Stocking rates also vary in accordance with such factors as kind and class of grazing animal and season of use.

Initial stocking rates are associated with range sites and range condition as a result of actual grazing experience. Selection of an initial stocking rate for a given pasture, grazing unit, allotment, or entire range is a planning decision. This decision should be made only after careful consideration of the total resources available, evaluation of all alternatives for use and treatment, and establishment of objectives by the decisionmaker.

308.1 Developing Stocking Rate Guides

Actual use records of individual range sites, together with a determination of the degree to which the sites have been grazed and an evaluation of their trend in range condition, are the most reliable basis for developing guides to initial stocking rates. Such records can be based on rancher experience or research and, preferably, should extend over several years and include seasons of high, low, and near-average forage production. In the absence of recorded stocking rate data, estimates can be made for specific range sites by interpolating data from similar sites. Extended over a period of years, such data indicate the approximate stocking rate and the variations that can be expected in favorable and unfavorable years. Data concerning initial stocking rates can be shown on range condition guides.

The assembly of actual grazing records and supplementary estimates of initial stocking rates from which guides can be developed is part of the basic resource inventory.

308.2 Stocking Rate Units

Stocking rates can be expressed in any of the following:

(a) Acres per animal-unit month;

(b) Animal-unit months per acre;

(c) Acres per animal-unit yearlong or for a specified period;

(d) Animal units per section; or

(e) Other units commonly used locally.

400 GRAZABLE WOODLAND RESOURCES AND INVENTORIES

401 GENERAL

In addition to providing wood products, watershed cover, and wildlife habitat, some kinds of woodland also produce sufficient understory vegetation suitable for forage that can be grazed without significantly impairing wood production and other forest values.

Production of wood products is the primary use of such land; consequently, grazing animals must be controlled and managed in a manner that maintains or enhances the potential of the area for timber, forage, recreation, and esthetical and other values. Woodland that has widely spaced trees, such as ponderosa pine and some of the southern pines, produce a crop of forage each year. Fir, spruce, hemlock, Douglas-fir, and many hardwood forests usually support such a dense stand of trees that a grazable understory is produced only periodically following clear cutting, extensive selective cutting or thinning, or fire.

The kinds and amounts of understory plants in the woodland are influenced by climate, soil properties, density and height of overstory canopy, accumulation of fallen needles and leaves, past woodland management practices, fire, and past grazing use.

Plants growing beneath a tree canopy are affected by the amount and quality of light they receive. They vary in their requirements for direct sunlight. Some that require a large amount of direct sunlight decrease as the overstory canopy increases, regardless of the degree of grazing. Other kinds of plants are shade tolerant and may increase in relative abundance when the tree overstory becomes more dense. All forage plants are affected by competition from other plants and by the season and degree of grazing use.

Maintenance of a useful grazing resource on grazable woodland requires both woodland management and grazing management. Although the understory is an integral part of the woodland ecosystem, its evaluation and management must be coordinated with the management of the tree overstory and, therefore, is somewhat different than for rangeland vegetation.

402 WOODLAND SUITABILITY GROUPS

402.1 Use and Development

SCS assists users of woodland in identifying and evaluating woodland productivity and suitability for appropriate uses.

Woodland suitability groups are usually the capability or interpretive units for woodland. In these groups are one or more soils that are capable of producing similar kinds of wood crops, that are of approximately the same productivity, and that require similar woodland harvesting methods and silvicultural practices.

Woodland suitability groups are differentiated on the basis of significant differences in total potential productivity, in dominant tree species, or in limitations for management or harvesting. (See National Handbook for Woodland Conservation.)

Foresters, soil scientists, and, as needed, range conservationists identify and describe suitability groups. Range conservationists (in states staffed with range conservationists) are responsible for the technical adequacy of the descriptions of understory vegetation and for guidance on grazable woodland.

402.2 Woodland Understory Descriptions and Interpretations

A technical description of the understory vegetation is to be prepared for each woodland suitability group that has significant value for grazing. The understory description can be an integral part of the description of the woodland suitability group (exhibit 402.2A) or it can be prepared separately if proper reference is made to the woodland suitability group to which the understory is related.

A single understory description can be prepared for two or more woodland suitability groups that are similar in the kinds and amounts of understory vegetation they produce and in their response to woodland management (exhibits 402.2B and 402.2C).

402.2 Continued

The description of the woodland understory is to include all grasses, grasslike plants, forbs, and woody plants within reach of domestic livestock or big game animals. This height is arbitrarily established at 4½ feet above the surface of the ground; it does not include current growth of overstory trees above 4½ feet.

Descriptions of woodland understory are to include the following, where appropriate, along with other pertinent information:

(a) Brief description of the general appearance and structure of the understory plant community. Indicate whether it is mostly a single layer or multilayers and whether it is relatively uniform or patchy and interrupted. Describe the approximate ground cover or plant spacing if significant.

(b) Inventory of the kinds, proportions, and amounts of understory plants expected under different amounts of overstory tree canopy. The overstory canopy can be divided into three broad classes--sparse, medium, and dense, as in exhibits 402.2A and 402.2C, or into four classes--open, sparse, medium, and dense, as shown in exhibit 402.2B, depending on the canopy responses of the particular understory being described.

Expected production of individual species in the understory can be recorded in pounds per acre by canopy class, as in exhibit 402.2A, or as a rating of the relative importance of each species in the community, plus the total production for the understory, as illustrated in exhibit 402.2B.

(c) Rating of the relative shade tolerance of the more abundant species. This rating provides a basis for interpreting the expected response of the species to changes in the overstory canopy that are likely to result from additional tree growth, thinning, harvest cutting, or fire. Shade tolerance is shown as S, indicating a high degree of shade tolerance; M, indicating moderate tolerance; or N, indicating intolerance of shade.

(d) Classification indicating the grazing value of each important understory species for specific kinds of livestock or wildlife. The classification is based on palatability or preference of the animal for a species in relation to other species, the relative length of the period that the plant is available for grazing, and the normal relative abundance of the plant. Three grazing value classes are recognized:

(1) Preferred plants. These plants are abundant in properly managed woodland, furnish useful forage for a reasonably long grazing period, and are preferred by grazing animals. They are generally more sensitive to grazing misuse than other plants and decline under continued heavy grazing.

(2) Desirable plants. In this class are useful forage plants, although not highly preferred by grazing animals. These plants either provide forage for a relatively short period or are not generally abundant in the understory stand. Some of these plants increase, at least in percentage, if the more highly preferred plants decline.

(3) Undesirable plants. These plants are relatively unpalatable to grazing animals, are available for only a very short period, are toxic or injurious, or generally occur in insignificant amounts. They may become abundant if more highly preferred species are destroyed because of improper grazing management or are injured or destroyed by other causes.

(e) Identification and authentication data. The description is to be identified and approved, following the same general procedures outlined for range sites in 302.9(i).

403 FORAGE VALUE RATING

403.1 General

The amount and nature of the understory vegetation in woodland is highly responsive to the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundance of plants occur as the canopy changes, often regardless of grazing use. Some such changes occur slowly and gradually as a result of normal changes in tree size and spacing. Other changes occur dramatically and quickly, following intensive woodland harvest, thinning, or fire.

403.1 Continued

For these reasons, the forage value rating of grazable woodland is not an ecological evaluation of the understory as is the range condition rating for rangeland. It is a utilitarian rating of the existing forage value of a specific tract of grazable woodland.

Significant changes do result from grazing use, however, and the understory can often be extensively modified through the manipulation of grazing animals.

403.2 Procedure for Determining Forage Value Rating

Forage value ratings are to be based on the percentage, by air-dry weight, of the existing understory plant community made up of preferred and desirable plant species. Four value ratings are recognized:

Forage value rating	Minimum percentage
Very high	50 preferred + desirable = 90
High	30-49 preferred + desirable = 60
Moderate	10-29 preferred + desirable = 30
Low	Less than 10 preferred

The production of understory plants can vary greatly, even within the same canopy class. Therefore, if the forage value rating obtained by considering only the percentage of preferred plants is very high or high, but the production is less than that expected for the existing canopy, reduce the final forage value rating one class.

Introduced perennial species are considered preferred plants if they are adapted and produce high-quality forage.

404 INITIAL STOCKING RATES

Guides to initial stocking rates for grazable woodland are to be developed in a manner similar to those for rangeland (section 300). Unlike rangeland stocking rate guides, however, those for grazable woodland must be adjusted to reflect the different canopy classes and forage value ratings. Examples of initial stocking rate guides for woodland are provided in exhibits 402.2A, 402.2B, and 402.2C.

405 MAPPING GRAZABLE WOODLAND

Areas of grazable woodland are to be delineated on the conservation plan map by solid lines. Delineated areas are to be identified as woodland. An indication of the forage value rating can be included on the map if space permits and it is desired by the operator.

500 NATIVE PASTURE RESOURCES AND INVENTORIES

501 GENERAL

Some areas that naturally support trees are used primarily for grazing rather than for the production of wood products. These areas are classed as native pasture. The management objective is the development and maintenance of vegetation, mainly native plants, suitable for grazing.

Native pasture may vary greatly in appearance. Some areas may be kept virtually free of tree growth, others may have a partial stand of trees, and still others may support a full, natural stand of noncommercial trees. Areas identified as native pasture are:

--Woodland severely depleted of trees by overharvesting, fire, or other extensive disturbances and the management objective is not to restore the tree stand.

--Woodland on which trees have been removed or extensively thinned for the specific purpose of increasing the grazing resource.

--Former cropland (originally woodland) on which the plant cover is changing to native species.

--Certain noncommercial deciduous woodland maintained primarily for grazing.

--Improved pastureland that has reverted to a voluntary stand of native vegetation.

One feature common to all native pasture is the persistent tendency to natural reestablishment of trees. The typical native pasture is a disclimax plant community. With few exceptions, some control or manipulation of woody plants is necessary to maintain optimum grazing values on native pasture and to prevent the reestablishment of a tree overstory.

If shade-tolerant forage plants grow beneath deciduous trees, no control of woody plants is needed. The forage plants make major growth and furnish valuable winter grazing after the leaves fall in autumn. If these trees are cleared or excessively thinned, the shade-tolerant forage plants, valuable for winter grazing, are replaced with warm-season plants adapted to increased sunlight. The warm-season plants may be less productive.

502 NATIVE PASTURE INVENTORIES

SCS assists users of native pasture in identifying, inventorying, and evaluating native pasture productivity and in determining the suitability of present and potential vegetation for appropriate needs and uses. Woodland suitability groups or native pasture groups are to be used as native pasture interpretive units.

502.1 Woodland Suitability Groups

The ecological potential plant community for land used as native pasture is woodland. Many native pasture plant communities closely resemble the understory of grazable woodland that has an open or sparse canopy occurring on similar soils. Therefore, woodland suitability groups for which there are understory descriptions and interpretations, as described for grazable woodland (section 400), can be used as interpretive or suitability units for native pasture occurring on the same soils for which woodland suitability groups have been identified and described.

502.2 Native Pasture Groups

Native pasture groups can also be used as the basic interpretive or suitability grouping for native pasture if woodland suitability groups have not been described or if they do not adequately serve this purpose. Native pasture groups consist of one or more soils capable of producing similar kinds and amounts of herbaceous natural vegetation. These soils are also usually capable of producing similar kinds and amounts of trees.

Descriptions of native pasture groups are to contain details about the herbaceous native plant community, its productive potential, and other pertinent features, as shown in exhibits 502.2 and 503. These descriptions may be similar to those for woodland suitability groups,

except the detailed natural tree overstory description may be omitted. Identification and approval is to follow the procedures outlined for range site descriptions in 302.9(i).

The soil scientist, agronomist, and range conservationist, working as a team, have the responsibility of identifying and describing native pasture groups. Assistance from biologists is to be solicited as needed.

503 NATIVE PASTURE INTERPRETIVE INFORMATION

Overstory canopy classes, shade tolerance of individual plant species, grazing value classes of plant species, and forage value ratings of some native pasture plant communities are to be determined in the same manner in which these factors are evaluated for grazable woodland. The guide for determining forage composition and value (exhibit 402.2B) can also be used in evaluating native pasture.

Also, as for grazable woodland, only the understory vegetation is considered in determining forage value ratings. Stocking rate guides can be included in the descriptions of the individual native pasture groups, as in exhibit 503, or omitted from the description (exhibit 502.2) and shown independently.

504 MAPPING NATIVE PASTURE

Areas of native pasture are delineated on conservation plan maps by solid lines. Delineated areas are to be identified as native pasture on the map. Forage value ratings can be included if desired by the operator and space permits.

600 GUIDE FOR DETERMINING APPROXIMATE PRODUCTION AND SPECIES COMPOSITION DATA

601 GENERAL

All production and composition data collected by SCS are to be based on weight measurements. Weight is the most meaningful expression of the productivity of a plant community or an individual species. It has a direct relationship to feed units for grazing animals that other measurements do not have. Other units of measurement, such as frequency and constancy of species, are automatically included in weight measurements. These other factors may be useful in further characterizing the plant community on a sample area but are incidental to the primary objective of determining production and species composition by weight.

Production is determined by measuring the annual aboveground growth of vegetation. Total production cannot be precisely determined because neither underground growth nor production of wood is measured. Some aboveground growth is used by insects and rodents or it disappears because of weathering before production measurements are made. Therefore, these determinations represent a productivity index. They are valuable for comparing the production of different range sites, plant species composition, and range condition. It is important that production data be obtained at a time of year when measurements are valid for comparison with similar data from other years, other sites, and various conditions being evaluated.

Comprehensive interpretation of plant production and composition determinations requires that data be representative of all species having measurable production. Rangeland and other native grazing land may be used or have potential for use by livestock and wildlife, as recreation areas, as a source of certain wood products, for scenic viewing, and for other soil and water conservation purposes. The value of plant species for domestic livestock often is not the same as for wildlife, recreation, beautification, and watershed protection. Further, the principles and concepts of range site, range condition, and other interpretations are based on the total plant community. Therefore, interpretations of a plant community are not limited solely to species that have value for domestic livestock.

The procedures and techniques discussed in this section relate primarily to rangeland. Most of them, however, also apply to grazable woodland and native pasture. Changes or modifications in procedures required for land other than rangeland are discussed.

602 PURPOSE OF DATA

Production and composition data properly collected, correlated, and analyzed provide ecological information required for technically sound planning, development, and management of native grazing land. Specifically, these data are used for such purposes as:

--Preparing and refining range site descriptions, woodland suitability groups, native pasture groups, and other interpretive groupings for use in technical guides;

--Coordinating the data with grazing history and stocking rate records in determining guides to initial stocking rates;

--Preparing soil survey manuscripts and other publications;

--Analyzing wildlife habitat values;

--Planning watershed and river basin projects;

--Assisting and training land users and operators in monitoring vegetation trends and the impact of applied conservation practices and programs;

--Exchanging ecological information with research institutions and agencies;

--Determining hydrologic cover conditions and correlating plant cover characteristics with runoff and sediment production; and

--Preparing guides and specifications for recreation developments, beautification, natural landscaping, and roadside seeding.

603 TOTAL ANNUAL PRODUCTION

603.1 General Definition

The total production of all plant species of a plant community during a single year is designated "total annual production." For specific purposes, production of certain plants or groups of plants can be identified as "herbage production" for herbaceous species, "woody-plant production" for woody plants, and "production of forage species" for plants grazed by livestock. Usable forage is not a definitive expression of production and is not to be used as a standard expression of production. Annual production, approximate production, total production, and production are used interchangably with total annual production throughout this section.

Total annual production on rangeland includes the aboveground parts of all plants (except mosses and lichens) produced during a single growth year, regardless of accessibility to grazing animals. An increase in the stem diameter of trees and shrubs, production from previous years, and underground growth are excluded. Production on grazable woodland and native pasture is similar, but plants beyond the reach of grazing animals, above 4½ feet, are excluded.

603.2 Definition for Various Kinds of Plants

(a) Grasses (except bamboos), grasslike plants, and forbs. Annual production includes all aboveground growth of leaves, stems, inflorescences, and fruits produced in a single year.

(b) Woody plants.

(1) Deciduous trees, shrubs, half-shrubs, and woody vines. Annual production includes leaves, current twigs, inflorescences, vine elongation, and fruits produced in a single year.

(2) Evergreen trees, shrubs, half-shrubs, and woody vines. Annual production includes leaves (or needles), current twigs, inflorescences, vine elongation, and fruits produced in a single year.

(c) Yucca, agave, nolina, sotol, and saw-palmetto. Annual production consists of new leaves, the amount of enlargement of old leaves, and the fruiting stem and fruit produced in a single year. Until more specific data are available and if current growth is not readily distinguishable, consider current production as 15 percent of the total green-leaf weight plus the weight of current fruiting stems and fruit. Adjust this percentage in years of obviously high or low production.

(d) Cacti.

(1) Pricklypear and other pad-forming cacti. Annual production consists of pads, fruit, and spines produced in a single year plus the enlargement of old pads in that year. Until more specific data are available and if current growth is not readily distinguishable, consider current production as 10 percent of the total weight of pads plus current fruit production. Adjust this percentage for years of obviously high or low production.

(2) Barrel-type cactus. Until specific data are available, consider annual production as 5 percent of the total weight of the plant other than fruit plus the weight of fruit produced in a single year.

(3) Cholla-type cactus. Until specific data are available and if current growth is not readily distinguishable, consider annual production as 15 percent of the total weight of photosynthetically active tissue plus the weight of fruit produced in a single year.

Any of these values (d1, 2, 3) can be changed if the results of research or local experience warrant.

604 METHODS OF DETERMINING PRODUCTION AND COMPOSITION

604.1 General

Production and composition of a plant community are determined by estimating, by a combination of estimating and harvesting (double-sampling), or by harvesting. Many plants are on state lists of threatened, endangered or otherwise protected species. Regulations concerning these species may conflict with harvesting procedures described. For example, barrel-type cactus in some states is a protected species and harvesting is not allowed. The weight of such plants is to be estimated, unless special permission for harvesting can be obtained. Conservationists determining production should be aware of such plant lists and regulations. ENVIRONMENT MEMORANDUM-1, (Rev.) states SCS policy on activities involving federal and state-designated threatened and endangered species.

604.2 Estimating (By "Weight Units")

(a) General. The relationship of weight to volume is not constant. For this reason, production and composition determinations are based on weight estimates, not on comparison of relative volumes. The weight unit method is an efficient means of estimating production and lends itself readily to self-training. This method is based on the following:

(1) A weight unit is established for each plant species occurring on the area being examined.

(2) A weight unit can consist of part of a plant, an entire plant, or a group of plants, exhibit 604.2(a)(2).

(3) The size and weight of a unit varies according to the kind of plant. For example, a unit of 5 to 10 grams is suitable for small grass or forb species. Weight units for large plants may be several pounds or kilograms.

(4) Other considerations include:

(i) Length, width, thickness, and number of stems, and leaves;

(ii) Ratio of leaves to stems; and

(iii) Growth form and relative compactness of species.

(b) Procedure for establishing a weight unit for a species.

(1) Decide on a weight unit (in pounds or grams) that is appropriate for the species.

(2) Visually select part of a plant, an entire plant, or a group of plants likely to equal this weight.

(3) Harvest and weigh the plant material to determine actual weight.

(4) Repeat this process until the desired weight unit can be estimated with reasonable accuracy.

(5) Maintain proficiency in estimating by periodically harvesting and weighing to check estimates of production.

(c) Estimating production and composition of a single plot.

(1) Estimate production by counting the weight units of each species in the plot.

(2) Estimate composition by weight for the plot.

(3) Convert weight units for each species to grams or pounds.

(4) Harvest and weigh each species to check estimates of production.

(5) Compute composition on the basis of actual weights to check composition estimates.

(6) Repeat the process until proficiency in estimating is attained.

(7) Periodically repeat the process to maintain proficiency in estimating.

(8) Keep the harvested materials, when necessary, for air-drying and weighing to convert from field (green) weight to air-dry weight.

604.3 Estimating and Harvesting (Double Sampling)

The double-sampling method is to be used in making most production and composition determinations. The procedure is:

(a) Select a study area consisting of one soil taxonomic unit. This should be a benchmark soil or taxonomic unit that is an important component of a range site, woodland suitability group, or native pasture group.

(b) Select plots to be examined at random. Random selection is defined as choosing plots in a manner to insure that every possible plot has an equal chance of being picked. Because standard statistical techniques are based on random sampling, random selection is essential if the data are to be used in making statistical analyses.

(c) The number of plots selected depends on the purpose for which the estimates are to be used, uniformity of the vegetation, and other factors. A minimum of 10 plots should be selected for all data to be used in determining range sites or other interpretive groupings and for data for use in the Range Data System. If vegetation distribution is very irregular and 10 plots will not give an adequate sampling, 20 plots can be selected. Fewer than 10 plots can be used if data are to be used for planning or application work with land users, but the data should not be entered in the Range Data System.

(d) Adapt size and shape of plots to the kind of plant cover to be sampled. Plots can be circular, square, or rectangular. Experience has shown that greater accuracy is usually obtained by using rectangular plots. The area of a plot can be expressed in square feet, in acres, or in square meters.

(1) If vegetation is relatively short and plot markers can be easily placed, 1.92ft^2, 2.40ft^2, 4.80ft^2, 9.60ft^2, and 96.0ft^2 plots are well suited to use in determining production in pounds per acre. The 9.60ft^2 plot is generally used in areas where vegetation density and production are relatively light. The smaller plots, especially the 1.92ft^2 plot, are satisfactory on areas of homogeneous, relatively dense vegetation like that occurring on meadows and throughout the plains and prairie regions. Plots larger than 9.60ft^2 should be used where vegetation is very sparse and heterogeneous.

(2) If the vegetation consists of trees or large shrubs, larger plots must be used. If the tree or shrub cover is uniform, a 66ft by 66ft plot 0.1 acre in size is suitable. If vegetation is unevenly spaced, a more accurate sample can be obtained by using a 0.1-acre plot 4.356ft wide and 1,000ft long. For statistical analyses, 10 plots 0.01 acre in size are superior to a single 0.1-acre plot.

(3) If vegetation is mixed, two sizes of plots usually are needed. A series of 10 square or rectangular plots 0.01 acre in size and a smaller plot, such as the 9.6ft^2 size "nested" in a designated corner of each larger plot is suitable. The 0.01-acre plot is used for trees or large shrubs and the smaller plot for lower growing plants. Then weights of the vegetation from both plots are converted to pounds per acre.

(4) Plots with area expressed in square meters is used if production is to be determined in kilograms per hectare. If the plots are nested, as described in (3), production from both plots must be recorded in the same units of measure. For example, a plot 20 m by 20 m (or other dimensions that equal 400 m^2) can be used for measuring the tree and shrub vegetation and a 1 m^2 plot nested in a designated corner can be used for measuring the low-growing plants. Determine the production from both in grams and convert the grams to kilograms per hectare. Plots of 0.25 m^2, 1 m^2, 10 m^2, 100 m^2, and 400 m^2 are commonly used.

604.3 Continued

(e) After plots are selected, estimate and record the weight of each species in each plot by means of the weight-unit method. When estimating or harvesting plants, include all parts of plants whose stems originate in the plot; including all aboveground parts that extend beyond a plot boundary. Exclude all parts of herbaceous plants and shrubs whose stems originate outside a plot, even though their foliage may overlap into the plot.

(f) After weights have been estimated on all plots, select the plots to be harvested.

(1) The plots selected should include all or most of the species in the estimated plots. If an important species occurs on some of the estimated plots but not on the harvested plots, it can be clipped individually on one or more other plots.

(2) The number of plots harvested depends on the number estimated. Research indicates at least one plot should be harvested for each seven estimated to adequately correct the estimates. At least 2 plots are to be harvested if 10 are estimated, and 3 are to be harvested if 20 are estimated.

(g) Harvest, weigh, and record the weight of each species in the plots selected for harvesting. Harvest all herbaceous plants originating in the plot at ground level. Harvest all current leaf, twig, and fruit production of woody plants, originating in the plots, on rangeland or to a height of 4½ feet above the ground on native pasture and grazable woodland.

(h) Correct estimated weights by dividing the harvested weight of each species by the estimated weight for the corresponding species on the harvested plots. This factor is used to correct the estimates for that species in each plot. A factor of more than 1.0 indicates that the estimate is too low. A factor lower than 1.0 indicates that the estimate is too high.

(i) After plots are estimated and harvested and correction factors for estimates computed, air-dry percentages are determined by air-drying the harvested materials or by selecting the appropriate factor from an air-dry percentage table, exhibit 604.3(i). Values for each species are then converted to air-dry pounds per acre or kilograms per hectare for all plots. Average weight and percentage composition can then be computed for the sample area.

604.4 Harvesting

This method is similar to the double-sampling method except that all plots are harvested. The double-sampling procedures for estimating weight by species and the subsequent correction of estimates do not apply. If the harvesting method is used, selection and harvest of plots and conversion of harvested weight to air-dry pounds per acre or kilograms per hectare are performed according to the procedures described for double sampling.

605 UNITS OF PRODUCTION AND CONVERSION FACTORS

605.1 General

All production data are to be expressed as air-dry weight in pounds per acre (lb/acre) or in kilograms per hectare (kg/ha).

605.2 Converting Weight to Pounds per Acre or Kilograms per Hectare

(a) The weight of vegetation on plots measured in square feet or in acres can be estimated and harvested in grams or in pounds, but weight is generally expressed in grams. To convert grams per plot to pounds per acre, use the following conversions:

On 1.92ft^2 plots, multiply grams by 50
On 2.40ft^2 plots, multiply grams by 40
On 4.80ft^2 plots, multiply grams by 20
On 9.60ft^2 plots, multiply grams by 10
On 96.0ft^2 plots, multiply grams by 1

(b) In the metric system, a square-meter plot (or multiple thereof) is used. Weight on these plots is estimated or harvested in grams and converted to kilograms per hectare. A

hectare equals 10,000 square meters. A kilogram equals 1,000 grams. To convert grams per plot to kilograms per hectare, use the following conversions:

On 0.25 m^2 plots, multiply grams by 40
On 1 m^2 plots, multiply grams by 10
On 10 m^2 plots, multiply grams by 1
On 100 m^2 plots, multiply grams by 0.10
On 400 m^2 plots, multiply grams by 0.025

When assisting land users and operators in determining approximate production, express data in pounds per acre. The following factors are to be used in converting from one system to another:

Metric units:

To convert	To	Multiply by
Kilograms per hectare.....	Pounds per acre	0.891
Kilograms.....	Pounds	2.2046
Hectares.....	Acres	2.471

U.S. units:

Pounds per acre.....	Kilograms per hectare	1.12
Pounds.....	Kilograms	0.4536
Acres.....	Hectares	0.4047

605.3 Converting Green Weight to Air-Dry Weight

(a) If exact production figures are needed or if air-dry weight percentage figures have not been previously determined and included in tables, retain and dry enough samples of harvested material to determine air-dry weight percentages.

(b) The percentage of total weight that is air-dry weight for various types of plants at different stages of growth is provided in exhibit 604.3(i). These percentages are based on currently available data and are intended for interim use. As additional data from research and field evaluations become available, these figures will be revised. Air-dry weight percentages listed in exhibit 604.3(i) can be used for other species having growth characteristics similar to those of the species listed in the exhibit. States that have prepared their own tables of air-dry percentages on the basis of actual field experience can substitute them for the tables in exhibit 604.3(i). Some interpolation must be done in the field to determine air-dry percentages for growth stages other than those listed.

The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shading, recency of rain, and unseasonable dry periods. It is important that a number of samples of plant material be harvested and air-dried each season to verify the factors shown or to establish factors for local use.

606 METHODS OF DETERMINING PRODUCTION AND COMPOSITION FOR SPECIFIC SITUATIONS

606.1 General

The intended use of the data being collected determines the method, or variation thereof, that is selected. Several activities require knowledge of production but in varying degrees of detail. The methods or variations that apply to several of these situations are outlined below.

606.2 Collecting Production and Composition Data for Documentation

Data to be used for preparing range site descriptions, grouping soils into range sites, initial development of range condition and other guides, determining production by condition classes, and processing in the Range Data Systems are to be obtained by the double-sampling procedure. All documentary production and composition data are to be recorded on form SCS-RANGE-417 (Rev.). Section 700 provides instructions for use of this form. Production determinations are made as follows:

606.2 Continued

(a) Tabulate production data by estimating and harvesting plots of the potential plant community for one or more soil taxonomic units associated with the site or group.

(b) Obtain production data from vegetation that has not been grazed since the beginning of the current growing season.

(c) Make determinations near or shortly after the end of the growing season of the major species. Give due consideration to species that mature early in the growing season. If plant communities consist of a mixture of warm- and cool-season species, two determinations may be needed during a single production year. The following procedure should then be used:

(1) Select two periods that will yield the best estimate of the growth of most of the important species.

(2) At the first determination, estimate and harvest only the species that are mature or nearly mature.

(3) At the second determination, select a new set of plots for estimating and harvesting all other species, but record the data on the same form SCS-RANGE-417 (Rev.) used for the first determination.

(4) At the second determination, harvest the plots having numbers corresponding to those harvested at the first determination. For example, if plots number two and four were harvested the first time, plots number two and four are harvested the second time. The computer can thus correct sampling errors as well as moisture data. Any species not included in these plots can be harvested individually, as outlined in 604.3(f)(1).

(5) If two determinations are made, record the date of the second determination in the REMARKS space of form SCS-RANGE-417 (Rev.).

(d) Repeat production determinations in different years to reflect year-to-year variations.

(e) Analyze production data from soil taxonomic units to determine the soils that should be grouped into specific range sites or other interpretive groupings and also to obtain data for inclusion in published soil surveys.

The procedures discussed above are also to be used in obtaining data for the various condition classes of range sites and for different forage value ratings of woodland suitability and native pasture groups. To accomplish this, collect data from areas that represent specific condition classes of the range site or forage value ratings of a native pasture or a woodland suitability group in a single production year.

606.3 Estimating Production and Composition of an Area

To determine range condition of a range site, areas of different range condition within a range site, and forage value rating of a woodland suitability group or a native pasture group:

(a) Estimate percentage composition by weight for the area to gain experience in making direct estimates of composition.

(b) Estimate production, in pounds per acre or kilograms per hectare, of individual species in the area.

(c) Compute percentage composition by weight of the area from estimated production data and compare computation with direct estimates of composition.

(d) To further check these estimates for the area as a whole, harvest or double sample the production on a series of random plots, as described in 604.3.

(e) Compute average production of the plots in terms of pounds per acre or kilograms per hectare. Using these average figures, compute average composition. Although by using this procedure some species of minor importance may be missed, the procedure provides a useful check on estimates.

(f) Repeat this procedure until proficiency is attained.

606.4 Inventorying Composition for Conservation Planning

Making a range condition inventory involves determining the species composition for each range condition class of each range site in a pasture. This can be determined by:

(a) Directly estimating total production per acre and production by species and then converting to percentage composition,

(b) Estimating and harvesting or estimating a series of plots in the area to determine production by species and then converting to percentage composition, or

(c) Directly estimating species composition percentages of the entire area as a unit.

During conservation planning, it is often necessary to determine plant composition when plant growth is not ideal for making such determinations. Some pastures are grazed at the time of planning. In places, estimates must be made at different stages of plant growth or when plant vigor varies from pasture to pasture. In some years production is obviously much higher or much lower than normal because of weather extremes. In making production estimates, therefore, it is often necessary to mentally reconstruct plant growth as it would most likely appear if undisturbed at the end of an "average" growing season.

606.5 Determining Production of Tree or Large Shrub Vegetation on Rangeland

Range condition guides are to include composition, by weight, of trees that are part of the climax plant community. Determining production of trees and large shrubs by harvesting portions of stands is time consuming and impractical for regular field operation planning procedures. Research scientists are devising methods for calculating current production of some species on the basis of measurements of such factors as crown width or height and basal area. These data, coupled with guidelines prepared by range conservationists using procedure outlined in this section, are to be used in estimating the annual production of trees and large shrubs.

Range conservationists and woodland conservationists work together to prepare production guides for various kinds of understory and tree stands for use by field office personnel. Range conservationists are to use the following procedures in preparing guides for rangeland:

(a) Select a few sample trees for each species. Samples should reflect variations in tree size, form, and spacing.

(b) Determine current production of sample trees.

(c) Determine production through a combination of estimating and harvesting. For estimates establish appropriate weight units. These units can be an entire small tree or a branch or cluster of branches from large trees, exhibit 604.2(a)(2). Determinations from sample trees should include all components of current production except bark and wood of other than curre twigs. Current leaf and twig production can be easily identified for some species. For the species, current leaf growth can be collected. Field determinations of production can be based on current leaf production only if data are available to indicate the percentage that various components contribute to total production. For example, Utah research shows that current production of balsam fir and Utah juniper is about 30 percent of the total foliage. Current production of these two species can be calculated by determining the total foliage present, then multiplying by 0.30, and adding to this figure the current fruit (cone) produc tion. For species requiring 2 years for fruit maturity, half the weight of mature fruit represents the current production of fruit.

(e) Repeat this process for stands of various kinds of trees or large shrubs. On the basis of data thus collected, prepare guides that list the approximate annual production for stands of various kinds of trees or large shrubs, exhibit 606.5(e).

The procedures discussed apply only to rangeland. Vegetation beyond the reach of grazing animals is not measured on grazable woodland and native pasture.

700 THE RANGE DATA SYSTEM

701 GENERAL

The Production Record (PR) segment of the Range Data System (RDS) is intended to provide an automated system for storage, rapid retrieval, and analysis of data on productivity and species composition for native grazing land. Segments are being developed for the orderly processing and use of other rangeland resource data. RDS, designed to be compatible with automatic data processing (ADP) systems for woodland, soils, and other interpretations, is part of the larger SCS information system.

702 PURPOSE AND USE OF PR-RDS

The purpose of RDS is to make readily accessible the vast amount of available production and composition data. These data are accumulated annually. A central automated system insures that all information is expressed in the same values. PR information will be retrievable through such key topics as soils, geographic location, precipitation zone, or some combination of such items. RDS can be used for:

--Grouping soils into range sites and interpretive groupings for SCS technical guides;

--Contributing to the overall knowledge of the ecology of native grazing land;

--Refining and improving interpretive groupings now in use;

--Predicting production and vegetation changes across climatic gradients;

--Documenting and monitoring trends in vegetation, changes in range condition, and the impact of different conservation treatments;

--Providing data for rangeland and understory vegetation sections of form SCS-SOILS-5, Soil Survey Interpretations;

--Preparing rangeland, native pasture, and grazable woodland sections of published soil surveys;

--Providing data for watershed and river basin projects;

--Interpreting and evaluating wildlife habitat;

--Providing baseline data for natural areas; and

--Providing an inventory of data to states to assist them in scheduling data collection.

703.2 Continued

(a) Date. Enter month, day, and year data were collected.

(b) County. Enter the name of the county where plot is located.

(c) State. Enter the name of the state in which plot is located.

(d) Location. Describe the location of the plot so that it can be easily relocated. List aerial photograph on which site can be located.

(e) Section grid. Indicate the plot location to the nearest quarter-quarter section on the grid. Show access road, if desired. Enter section, township, and range in spaces provided.

(f) Data by. Enter the name(s) of individual(s) who collected the data.

(g) Cooperator (bottom of form). Enter name of cooperator, if desired.

(h) SWCD. Enter name of soil and water conservation district in which plot is located, if desired.

(i) Field office and area. Enter the name of town in which SCS field office is located and area number, if desired.

(j) Vegetation type (Kuchler). Enter the name of the potential natural vegetation type as mapped by Kuchler in the National Atlas of the United States (1970).

(k) Site name. Enter the local name assigned to the site where the plot is located.

(l) Site number. Enter the site number if one exists.

(m) Soil classification (subgroup and family). Enter the classified name for the soil series, if available.

(n) Current season precipitation. Enter precipitation for current season, if known; generally the to-date total for the calendar year.

(o) Vigor. Enter an adjective rating of vigor for the current growing season; for example, strong, moderate, and weak.

703.3 Location Data Line (Front of Form)

(a) Sample number. The sample number is to be controlled in each state. This number consists of three parts and is to be completed as follows:

(1) ID. No. Enter a number that identifies the data sheet by state and county. Every sheet is to have a separate number in a particular county for any single year. If the same area is sampled again in subsequent years, enter the same number. This insures that data collected from the same sample area will always have the same site number.

(2) YR. Enter the last two digits of the year in which data were collected.

(3) ST and CNTY. Enter FIPS (Federal Information Processing Standards) code for state and county. These codes are the same as those used for progress reporting and timekeeping. This item is required for all data systems.

(b) Date. Enter month and day in numeric form, using two digits for day and two digits for month, i.e., 0102 = January 2 or 1102 = November 2. Always enter numbers with no spaces between.

(c) Major land resource area. Enter the number of the major land resource area as shown in Agriculture Handbook 296. Subdivisions, where required, are entered in the subdivision block. If no subdivision is used, leave the block blank.

(d) Land survey. Land survey is one of two land coordinate systems that can be used in identifying the geographic location of the plot. One of the two systems must be used. Enter the section(s), township(twp), and range(rng).

703.3(d) Continued

This is the standard system for all states surveyed by contract from the General Land Office. The original thirteen states, Texas, and New Mexico, have surveys in "metes and bounds." The USGS Quad sheets at 1:250,000 scale for these states, as well as for all other states, have the township and range lines printed on them. Therefore, the section where the plot is located can be determined by interpolation.

(e) N. latitude and W. longitude. If the land survey coordinate system described is not used, this system must be used. Enter the latitude and longitude to the nearest 30 seconds if possible.

(f) Soil survey sample number. If a soil profile was described and a Soil Survey Sample No. assigned, enter that number in this space, thereby providing a "tie-in" between PR-RDS and the Soil Data System (SDS-PD).

(g) Card ID. A control number is to be assigned by central processing.

703.4 Site Data Line (Front of Form)

(a) Kind of land. Enter one of the following numbers to indicate the kind of land from which the production data was taken:

1--Rangeland
2--Grazable woodland
3--Native pasture
4--Rangeland (formerly cultivated)
5--Grazable woodland (formerly cultivated)
6--Nongrazable woodland (understory)

(b) Use history. Record the approximate intensity of grazing or other use during the past 10 years:

1--None or slightly grazed
2--Properly grazed
3--Overgrazed
4--Harvested for hay
----(dash)--History unknown

(c) Kind of animal. Enter as many as five letters to indicate the kind and combination of grazing animals, exclusive of rodents. List the dominant kind first and the others in descending order, left to right:

A--Antelope
B--Bison
C--Cattle
D--Deer
E--Elk
G--Goats
H--Horses and mules
S--Sheep
Ø--Other
----(dash)--Unknown

If only cattle are important, enter C. If cattle, sheep, and deer are important in that order, enter CSD.

(d) Season of use. Use the appropriate digit or combination of digits (as many as four) to show the general seasonal use pattern.

----(dash)--Unknown
0--Not grazed
1--Spring
2--Summer
3--Fall
4--Winter
5--Specialized system that regularly alternates the season of use.

For example, year-long use would be 1234; spring-fall use would be 13.

(e) Site cond (site condition). Use only for rangeland to show the percentage composition for the entire sample area that is considered potential, or climax, by current range condition guides. Enter a dash for grazable woodland or native pasture.

(f) Burning. Record the general history of burning on the study area as follows:

----(dash)--Unknown
1--Rarely, if ever, burned
2--Occasionally burned
3--Systematically burned

703.4 Continued

(g) Brush mangt (brush management). Enter the code to describe general history of brush management in the study area as follows:

----(dash)--Unknown	3--Within past 5 years
1--None	4--Within past 10 years
2--Within past year	5--More than 10 years ago

(h) Elev (elevation). Enter elevation above sea level to the nearest 100 feet.

(i) Expos (exposure). Enter the dominant exposure of the sample area, using the appropriate abbreviation:

NW--Northwest	SE--Southeast
N--North	S--South
NE--Northeast	SW--Southwest
E--East	W--West

NS--Exposure not significant

(j) Slope. Enter the dominant slope of the sample area to the nearest one percent.

(k) Precip (precipitation). Enter average annual precipitation to the nearest inch.

(l) Grow season (growing season). Rate the current growing season as reflected in the growth of dominant species. This rating should reflect more than total rainfall. It should reflect moisture distribution, temperature, and other factors affecting production. Enter one of the following codes:

1--Unusually good	3--Average
2--Above average	4--Below average

5--Unusually poor

(m) Crypt (cryptogams). Enter one of the following codes that describes cryptogam cover, if important.

High----67-100% ground cover
Med-----34-66% ground cover
Low-----0-33% ground cover

(n) Card ID. Control number is to be assigned by central processing

703.5 Soil Data Line (Front of Form)

(a) Soil series name. Enter the full name of series for the soil taxonomic unit being sampled. It is not necessary to enter the slope phase because slope is recorded on the site data line.

(b) Modifer and texture. Enter textural phase. The following codes for soil texture and texture modifers are used in soil surveys. These codes are to be used for all data processing, including RDS. Additional symbols, if needed, are provided in section 407.1(a)(3), National Soils Handbook, part II.

Modifiers

GR	gravelly
GRC	coarse gravelly
GRF	fine gravelly
GRV	very gravelly
MK	mucky
PT	peaty
SH	shaly
SHV	very shaly
SR	stratified
ST	stony
STV	very stony
STX	extremely stony
SY	slaty

Texture

CØS	coarse sand	SCL	sandy clay loam
S	sand	CL	clay loam
FS	fine sand	SICL	silty clay loam
VFS	very fine sand	SC	sandy clay
LCØS	loamy coarse sand	SIC	silty clay
LS	loamy sand	C	clay
LFS	loamy fine sand	G	gravel
LVFS	loamy very fine sand	MPT	mucky peat
CØSL	coarse sandy loam	MUCK	muck
SL	sandy loam	PEAT	peat
FSL	fine sandy loam	L	loam
VFSL	very fine sandy loam	SI	silt
		SIL	silt loam

(c) Detailed profile description. If a suitable profile description for the series on the site exists or was taken at the time of the sample, enter Y; if none is available or none was taken, enter N.

(d) Card ID. Control number is to be assigned by central processing.

703.6 Measure Data Line (Front of Form)

(a) Weight. Enter the appropriate code to indicate weight category for the plot:

1--Fresh (green) weight
2--Air-dry weight
3--Oven-dry weight

This weight is very important because air-dry weights are to be loaded directly into the calculation, and fresh (green) and oven-dry weights will be converted to air-dry by the computer.

(b) Meas (measurements). Enter the appropriate system of measurement used in calculating data. If the English system was used, enter E; if the metric system was used, enter M. Use only one system in completing entries. For example, if weights are given in pounds, areas should be in feet or acres.

(c) Plot size and shape. For recording the size and shape of plots, 10 spaces are provided. If only one plot was used to collect data, enter data in the right half of the data block (last five spaces). If both a small and a large plot were used in combination, give the size and shape of the large plot in the left half of the data block (first five spaces). Notations are to be made as follows:

First, give the total area of the plot in square meters or square feet. Write only the number. Directly after the number, write one of the following letters to indicate the shape of the plot:

C--Circular
S--Square
R--Rectangular

For example, if the plot is 3.1 feet by 3.1 feet, write 9.6S in four of the five spaces on the right half of the data block. If a plot is 3.1 by 3.1 feet and is used in combination with a rectangular one tenth-acre plot, the notations would be 4356R 9.6S. Convert acres to square feet.

(d) Conv fact (conversion factor). Enter the factor required to convert grams per plot to pounds per acre or kilograms per hectare. Use only if values shown in columns P-1 through P-10 and columns 4, 5, and 6 are expressed in grams. Leave blank if values in these columns are expressed in pounds per acre or in kilograms per hectare. Conversion factors for the more commonly used plot sizes are shown in section 600.

703.6 Continued

(e) Clipped plots. Enter the plot numbers of the plots clipped; see reverse side of form. Left-justify numbers and enter with no commas or spaces between. Show plot 10 as 0 (zero). If no plots were clipped, enter a dash.

(f) Canopy (grazable woodland, savanna range sites and native pastures). Enter the estimated percentage of ground shaded at midday by trees and shrubs taller than grazing height. Enter a dash if this item is not applicable.

(g) Overstory species (grazable woodland and native pasture). Enter the plant symbol as shown in the National List of Scientific Plant Names (NLSPN) for the major overstory species in the sample area. Space is provided for as many as three entries (use five spaces for each entry); for example, JUOC_PIED_JUSC2. Enter a dash, if not applicable.

(h) Detailed overstory descrip. If a detailed description was made of the overstory on the sample site, enter Y; if none was made, enter N.

(i) Total No. of plots sampled. Enter total number of plots sampled.

(j) Card ID. Control number is to be assigned by central processing.

703.7 Remarks Lines (Front of Form)

Three lines (65 characters per line) are to be used for essential narrative information. Print letters between tick marks to insure proper spacing of words. Remarks can include the identification number of associated overstory plot information or the source of data if it was provided by non-SCS personnel.

703.8 Plot Data (Reverse Side of Form)

(a) Plant name (column 1). Enter the scientific name of each species on any or all plots if known. If not known, the common name is satisfactory. The scientific name is preferred because standard plant symbols are derived from this name. If minor species are insignificant or cannot be readily identified, enter the genus. If groupings more general than the genus level are required, use such terms as "other annual grasses," "other perennial grasses," or "other annual forbs," as in item (b).

(b) Plant symbol (column 2). Enter the appropriate standard plant symbol for each species or genus as listed in NLSPN. If plants contribute a significant amount of production, and cannot be identified at the genus level, they should be grouped according to life form and longevity and coded according to the following symbols:

PPGG--Other perennial grasses
AAGG--Other annual grasses
PPFF--Other perennial forbs
AAFF--Other annual forbs
PPGL--Other perennial grasslikes
AAGL--Other annual grasslikes
HHSS--Other half-shrubs
SSSS--Other shrubs
TTTT--Other trees
UUUU--Unknown

Note: It is not advisable to store data in a national file, collected by a professional, that is listed as Unknown. It tends to reduce data quality.

(c) Plant char (plant characteristic). Enter the appropriate plant characteristic symbol for each species, as listed in NLSPN. Occasionally, the characteristic of a particular species will be different from that shown in NLSPN. For example, a species may be shown as a perennial in NLSPN, but it responds as an annual in a specific locality. Thus, the symbol that characterizes the plant in the specific locality, not that listed in NLSPN, should be entered. NLSPN does not give plant characteristic symbols for genera. If a genus symbol is used in column 2, enter the plant characteristic symbol that characterizes the vegetation recorded. For example, if HELIA3 is entered in column 2 for a sunflower that cannot be

identified according to species, write PNF in column 3 if it is a native perennial, or ANF if it is a native annual. Do not enter plant characteristic symbols for plants grouped according to the special symbols listed in (b), because all known characteristics of these plants are incorporated in those plant symbols.

(d) Plots (columns P-1 through P-10). Enter the weight in grams or pounds per acre or in kilograms per hectare for each species or group. Be sure that fresh, air-dry, or oven-dry weights are used consistently. If small and large plots are used together (nested), the weight values for both must be either in pounds per acre of in kilograms per hectare. Show trace amounts of species by entering a T in the plot(s) where the trace occurs. Circle the plot number for each plot that is clipped. If a species occurs that is not in one of the clipped plots, clip the species in the plot where it does occur and circle the estimated weight associated with it.

(e) WT clipped plots (columns 4, 5, and 6). These columns are to be completed if double-sampling procedures are used in collecting.

(1) Est (column 4). Enter the total estimated weight by species for all clipped plots.

(2) Clip (clipped) (column 5). Enter the total harvested weight by species for the plots that are clipped.

(3) Dry (column 6). Enter the actual total air-dry weight of all species from the plots that are clipped. Use column 6 only if clipped material was actually air-dried.

(f) PCF (5-4) (plot correction factor) (column 7). In column 7 the conservationist is to enter the factor for correcting the estimates for each species if the double-sampling technique is used. This factor is computed by dividing the clipped weight (column 5) by the estimated weight of the plots actually clipped (column 4). Column 7 is provided mainly to assist in computing average production and percentage composition for the sample area (columns 10 and 11). It is not to be used in computer processing.

(g) % Dry Wt (column 8). Enter the percent dry weight used to convert fresh weight to air-dry weight. This can be a standard factor, but if the material was air-dried, it can be computed by dividing the figure in column 6 by that in column 5.

Note: When techniques other than double sampling are used to compute weights, columns 4, 5, 6, and 7 need not be used. Column 8 must always be completed for each species if fresh weights are used.

(h) Wt all plots (weight all plots) (column 9). If necessary, enter in column 9 the total weight for each species from all plots. Column 9 is provided to facilitate computation of average production and percentage composition (columns 10 and 11) by the conservationist in the field. It is not used for computer processing.

(i) Avg yield and PCT Comp (columns 10 and 11). These data are to be computed by the conservationist who makes the production determination for his own analysis, training, and immediate local use. The same is true for the total weights of each plot. Compute as air-dry weight in pounds per acre on in kilograms per hectare.

(j) Residues (mulch). Estimate and enter the weight of mulch in each plot. Gather and weigh the mulch on the plots that are clipped, then enter the total weight of the mulch in column 5. Also enter an air-dry weight in column 6 or an air-dry factor in column 8. These figures will be used to correct the estimated values in each plot the same as is done for species.

(k) % Coverage (cøver). Estimate and enter for each plot the percentage of the plot area covered by foliage of plants within reach of grazing animals (4½ feet above the ground).

(l) % Bare ground (bare). Estimate and enter for each plot the percentage of the area that has bare soil exposed. Do not include the area covered by mulch or stones.

(m) % Rock cover (røck). Estimate and enter for each plot the percentage of the plot area covered by rock, stones, or gravel.

4(

703.9 Other Sources of Data

It is anticipated that data from universities, experiment stations, other agencies, and other sources outside SCS will be made available for use in PR-RDS. Such data will be identified as to source under remarks and stored and used in the same manner as SCS information.

703.10 Data Collection

Field procedures for collecting production and composition data are adequately discussed in section 600.

704 DATA PROCESSING FOR STORAGE, RETRIEVAL, AND ANALYSIS

704.1 General Processing of Data

All data recorded on form SCS-RANGE-417 (Rev.) are to be channeled through the state office t the Data Center for editing, storage, retrieval, and analysis. It is essential that all forr be carefully checked and that only quality data be forwarded to the Data Center. Exhibit 704 shows the general flow of data processing.

704.2 Processing Form SCS-RANGE-417 (Rev.)

When form SCS-RANGE-417 (Rev.) is received at the Data Center, it is checked and keypunched. A computer program accepts the information, corrects all values for sampling error and moist content, and produces two tables. Table 1 (exhibit 704.2A) includes all heading data, weight values corrected to pounds per acre and kilograms per hectare, air-dry weight for all specie in all plots, and the average production and percent composition for the sample area. Space is provided under remarks for explanations of unusual situations or conditions. This table provides the data set that will be stored in the Data Bank. Table 2 (exhibit 704.2B) lists the raw data exactly as shown on form SCS-RANGE-417 (Rev.). It is provided for double checking the transformation of data from the field form to storage. Table 2 can be discarded aft checking is completed. Sufficient copies of both tables are returned to the state that provided the data for filing at state, area, and field office levels.

800 CORRELATING LIVESTOCK MANAGEMENT WITH GRAZING RESOURCES

801 GENERAL

Successful conservation and efficient use of native grazing land depends on successful correlation of the treatment and management of forage plants with the management of the animals that harvest the plants.

SCS conservationists who work with livestock producers are to be thoroughly familiar with locally adapted livestock husbandry and livestock management principles and practices applicable to proper and efficient use of grazing resources. SCS conservationists are not to provide technical advice or assistance to livestock producers on matters relating primarily to animal breeding, genetics, or animal health problems (except when animal health is related to forage resources). Conservationists should acquire enough information about these matters, however, to enable them to discuss them intelligently with livestock producers.

802 MAINTAINING A BALANCE BETWEEN LIVESTOCK NUMBERS AND AVAILABLE FORAGE

The objective of most grazing management programs is to make optimum use of forage resources while maintaining or improving the resources. To accomplish this, a proper balance must be maintained between the number of animals using the forage and the amount and quality of forage produced. No 2 years have exactly the same weather conditions. For this reason, year-to-year and season-to-season fluctuations in forage production are to be expected on native grazing land. Livestock producers must make timely adjustments in the numbers of animals or in the length of grazing periods to avoid overuse of forage plants when production is low and to avoid waste when forage supplies are above normal. A livestock, forage, and feed balance sheet (exhibit 1203.4) is useful in summarizing livestock and forage resources for use in planning and followthrough work.

802.1 Determining Animal-Unit Equivalents

The animal-unit is a convenient denominator for use in calculating relative grazing impact of different kinds and classes of domestic livestock and of common wildlife species. An animal unit (AU) is generally one mature cow of approximately 1,000 pounds and a calf as old as 6 months of age, or their equivalent. An animal unit month (AUM) is the amount of forage required by an animal unit for one month.

Animal unit equivalents vary somewhat according to kind and size of animals. States can therefore establish their own AU guides on the basis of locally available data relative to forage requirements. The following is a guide to AU equivalents.

Animal-unit equivalents guide

Kinds and classes of animals	Animal-unit equivalent
Cow, dry	1.00
Cow, with calf	1.00
Bull, mature	1.25
Cattle, 1 year of age	.60
Cattle, 2 years of age	.80
Horse, mature	1.25
Sheep, mature	.20
Lamb, 1 year of age	.15
Goat, mature	.15
Kid, 1 year of age	.10
Deer, white tailed, mature	.15
Deer, mule, mature	.20
Antelope, mature	.20
Bison, mature	1.00
Sheep, bighorn, mature	.20
Exotic species	(To be determined locally)

802.2 Maintaining Flexibility in Forage Production and the Size and Composition of Herd

By incorporating a degree of flexibility into the forage supply or the animal herd composition, or both, producers can more readily make prompt and timely adjustments to keep the number of livestock in balance with forage supplies. Flexibility can be achieved through u of such practices as:

(a) Maintaining part of the land in pastureland or in hayland. When forage is in short supply on native grazing land, pastureland or hayland can be grazed. In years of abundant forage growth, the operator can use pastureland and hayland to produce hay, and he can sel the surplus crop or store it for use when forage is in short supply.

(b) Maintaining part of the livestock herd as steers, stockers, or other kinds of animal If forage supplies fluctuate, the number of these animals can be increased, decreased, or adjusted or the animals can be disposed of quickly.

(c) Maintaining part of the total livestock herd as breeding animals and the rest as hol over calves, lambs, steers, or short-term stockers. In years of low forage production, th number of stocker animals is reduced as necessary and the available forage is reserved for the breeding herd. In years of abundant forage production, the number of stocker animals increased to take advantage of the additional forage.

This practice protects the integrity of the breeding herd, which is often established over period of years at great expense. For optimum flexibility, the ratio between breeding ani and stocker animals varies from place to place, depending upon expected fluctuations in forage production. In some areas of low and erratic precipitation, no more than 50 to 60 percent of the normal herd numbers should be breeding animals. The rest should be livest better suited to flexible marketing. Where precipitation is higher and more dependable, however, breeding animals might safely make up 75 percent or more of the normal herd numb Local technical guides reflect variations to be expected in forage production, which can used as an aid in assisting the cooperator determine appropriate animal herd composition.

(d) Reducing number of animals likely to damage forage during periods of low production During periods of low forage production, if two or more kinds of domestic animals are gra the greater degree of flexibility results from heavy culling of the kind of animal most likely to damage forage resources.

(e) Maintaining herd numbers at a level that would be proper during years of less favor forage production and renting or leasing part of the grazing land to other operators duri years of normal or above normal forage production.

802.3 Making Needed Adjustments During Years of Low Forage Production

Adjustments in livestock numbers, periods of grazing, or use of reserve forage supplies during unfavorable years should be made as quickly as practical after it becomes apparen that forage will be in short supply. The tendency to delay adjustments while "hoping fo another rain" often results in severe damage to millions of acres of grazing land and in severe economic losses to many livestock producers.

If livestock operators are to make necessary adjustments during unfavorable years, a pla often referred to as a "drought plan," should be prepared to meet this contingency when are developing their total conservation program.

The following are typical of the kind of adjustments that livestock producers can make d years of low forage production to help keep the number of livestock in balance with avai forage:

(a) Improve grazing distribution in pastures to increase efficiency in use of availabl forage.

lves, lambs, kids, steers, and stocker animals early in the season or as ,ity of a feed shortage becomes apparent.

breeding herd more closely and heavily than normally. Market dry cows, milkers, and older animals.

802.3 Continued

(d) Lease additional pasture if available, or purchase forage.

(e) Use supplemental or temporary pastures. Temporary pastures, however, are seldom practical in dry years unless irrigation water is available. Graze hay fields for short periods.

(f) Regraze pastures. If stocking rates are kept at a conservative level, generally one or more pastures will be either ungrazed or lightly grazed. This reserve of mature forage will often maintain the herd for a short period until adjustments can be made. An occasional close grazing for a short period normally will not cause serious damage to the forage plants.

(g) Use the flexibility built into properly planned grazing systems.

802.4 Making Needed Adjustments During Years of Surplus Forage Production

Unless continued for long periods, underutilization of forage is not so detrimental to forage resources as overutilization. Significant underutilization, however, is not necessary and is often wasteful. Several options available to the livestock producer during years of above normal forage production are:

(a) Purchase dry stock, such as steers, calves, and wethers, for short-term gains.

(b) Hold calves, lambs, and kids for late markets or winter some as a "buffer" herd to be marketed during the next spring or early in summer, depending on the forage supply.

(c) Hold over more replacements, which provides an opportunity to upgrade the breeding herd.

(d) Cull breeding herd less severely than normally. Keep aged females that are likely to successfully breed again.

(e) Cut part of excess forage for hay or silage for cash sale or to keep as a reserve for years of low production.

(f) Lease surplus forage to other livestock producers on a temporary basis.

803 PROPER DISTRIBUTION OF LIVESTOCK FOR EFFICIENT FORAGE USE

Proper distribution of animals in pastures or grazing units is sometimes more important to the proper use of grazing land than animal numbers. Pastures may be significantly understocked in relation to the amount of forage available and yet contain extensive areas that are severely damaged because animals graze only part of the pasture. Poor grazing distribution generally results in nonuse or underutilization of part of the forage in the pasture. Several practices or techniques are of value in attaining proper animal distribution.

803.1 Use of Different Kinds and Classes of Livestock

Use of different species and classes of livestock can be helpful in obtaining more uniform use of forage. For example, sheep and goats usually graze steep rocky areas more uniformly than cattle. Likewise, yearling cattle graze steep areas better than cows with calves.

803.2 Fencing

Fencing is a positive way of controlling and confining livestock to certain areas. The number and size of pastures needed on any given operation depend to a large extent on:

(a) Species and classes of livestock. An operator who has both sheep and cattle or both commercial and registered animals generally needs more pastures than one who grazes only one kind and class of livestock.

(b) Size, shape, and topography of pasture or grazing unit and whether cropland or pastureland is intermingled. As a rule, grazing efficiency is lower in large pastures and in pastures where the topography is rougher or steeper than in others.

(c) Number of range sites, woodland suitability groups, or native pasture groups and range condition or forage value rating of each. Applying proper management practices to the grazing resources is much easier if different plant communities are fenced and managed separately because of differences in palatability and growth habits of the vegetation.

(d) Number of grazing animals and length of grazing periods. Animals generally graze a pasture more uniformly if large numbers are grazed for short periods. In many areas, livestock harvest the forage efficiently and uniformly if enough animals are in the pasture to harvest the forage in 3 to 4 weeks. Most planned grazing systems provide for concentration of animals for short grazing periods, alternating with long rest periods for each pasture.

(e) Amount, location, and dependability of water supplies for livestock. This consideration is particularly important in regions where stock water development is a major problem. Selective placement of stock water facilities is usually the most efficient technique for achieving uniform grazing distribution.

(f) Potential of land for use by big game. Selecting the proper type of fence is an important consideration on ranges where climatic conditions and a lack of dependable water force big game animals to migrate. Special fence designs are needed if pronghorn antelope use the range.

803.3 Livestock Water Facilities

Properly located, adequate, clean, and dependable water supplies are essential for good grazing management and proper distribution of livestock.

Generally, stock water is developed for a year-round supply. There are some opportunities, however, for use of seasonal water supplies where vegetation can be grazed on a seasonal basis and year-round water supplies are not available.

In some locations where the expense of a single-water facility is excessive or the source of water is limited, pipelines are used to obtain the desired spacing of water. Spacing is less important in small pastures than in large ones. Hauling water to temporary troughs is often practical in areas where the grazing period is relatively short and other sources of water are too costly.

Storage facilities (tanks and troughs) at watering locations should be of adequate size to provide enough water in a 2-hour period for all animals grazing a given pasture.

The following general guidelines pertinent to water requirements can be modified to fit local conditions:

(a) "Rule of thumb" guide for spacing livestock water facilities.

Type of terrain	Travel distance, feed to water (optimum)
	Mile
Rough	1/4 to 1/2
Rolling	3/8 to 3/4
Level	3/4 to 1

(b) General livestock water requirements per day.

	Gal
Cows	10 to 15
Sheep	1/2 to 1
Goats	1/2 to 1
Horses	10 to 12

(Add water requirements of wildlife if computing required minimum water flow or storage)

803.3 Continued

(c) Wildlife water requirements per day.

	Gal
Elk	2 to 3
Deer	1/2 to 1
Antelope	1/2 to 1

(Requirements vary according to such factors as location and season.)

803.4 Proper Location of Salt, Minerals, and Supplemental Feed

Properly locating salt and minerals (and supplemental feed if required) in properly fenced and watered pastures encourages good distribution of grazing. They should be placed in undergrazed areas to insure that all parts of the pasture are uniformly grazed. Portable feeders permit salt and minerals to be moved from place to place in the pasture, thus making it possible to adjust grazing use according to utilization patterns. Salt and minerals should not be placed near key habitats for wildlife and, with few exceptions, should not be placed adjacent to livestock water. The number of salting locations needed depends on the size and topography of the pasture and on the number and kind of livestock using the pasture.

(a) Approximate number of animals one salting location adequately serves on different types of terrain.

(1) 40 to 60 cattle or 125 to 200 sheep or goats grazing level to gently rolling range.

(2) 20 to 25 cattle or 100 to 150 sheep or goats grazing rough range.

(b) Salt locations. Salt locations should be no more than ½ to 1 mile apart on rough range and no more than 1½ to 2 miles apart on gently rolling range. If sheep are open herded, as is done in some western states, salt is provided at the bedground.

(c) General salt requirements for grazing animals.

	Lb/mo
Cows	1-1/2 to 3
Horses	2 to 3-1/2
Sheep and Goats	1/4 to 1/2

(Requirements vary according to such factors as climate, area, kind of vegetation, and stage of growth.)

803.5 Herding

Herding is the most positive and effective method of getting livestock to graze in desired areas but it is also very costly. Herds should move to new locations often enough to prevent overuse of forage and to prevent unsanitary conditions.

803.6 Cattle Walkways

Constructing cattle walkways on marsh rangeland and on areas subject to overflow is a means of encouraging better grazing distribution in a pasture. If water covers the marsh, cattle usually graze only about one-fourth mile into the marsh from ridges or firm ground. Walkways make areas of firm marsh accessible for grazing.

803.7 Stock Trails

In steep, rocky areas and in areas of dense timber or brush, stock trails encourage better distribution of grazing by providing easier access to forage-producing areas.

803.8 Forage Quality Manipulation

Treating areas to increase palatability or accessibility of forage can improve grazing efficiency. Examples of such treatment are:

(a) Applying fertilizer to undergrazed areas or to stands of less-preferred forage plants to increase palatability, thereby encouraging grazing on the treated areas.

803.8 Continued

(b) Prescribed burning or shredding to remove old, rough growth and excessive litter that interfere with livestock grazing.

804 SUPPLEMENTING FORAGE DEFICIENT IN NUTRIENTS

The purpose of supplemental feeding on grazing land is to correct deficiencies in protein o other essential nutrients in the native forage.

804.1 Protein Supplement

(a) On most native grazing land, dry standing forage does not constitute a balanced live-stock diet.

(b) The amount of protein supplement required per animal each season varies tremendously. Generally 1½ to 2½ lb per day of 41 percent protein supplement per 1,000-lb cow are needed during critical periods.

Once protein supplemental feeding is initiated, it is important that the feeding rate be sufficient to meet most of the animal's requirements and that it be continued until protei levels of available forage become adequate to meet the requirements of the animal. Insuff cient amounts of protein supplement may be more detrimental to the animal's performance th no protein supplement. The micro-organisms in the stomach of a ruminant adjust to break down the low-quality proteins in dry mature forage. Introducing insufficient amounts of a supplement containing highly soluble proteins alter the kinds and numbers of rumen microfl so they become less effective in utilizing the less soluble protein of mature forage. The total amount of digestible protein used by an animal may thus be less than if no supplemen had been fed.

The standard for feeding protein to cattle is generally based on 41 percent cottonseed cub or 43 to 48 percent soybean meal. Feeding these protein supplements, coupled with adequat amounts of dormant vegetation, is generally the most efficient method of providing supplem to cattle. If any supplement mixture other than the two mentioned are fed, consideration should be given to the following:

(1) Cost per pound of digestible protein in mixtures, compared with that of cottonsee or soybean derivatives,

(2) Quality of the product,

(3) Effectiveness of mixture in balancing the needs of the animal with the kind of ve tation grazed,

(4) Possible detrimental effects of the mixture to domestic animals and big game anim

(5) Value of added trace elements and vitamins in mixture, and

(6) Labor requirements.

(c) Methods of feeding protein supplements include:

(1) Mixing salt with protein supplement to control intake,

(2) Blending urea with molasses,

(3) Use of protein blocks,

(4) Use of range cubes or pellets (soybean or cottonseed), and

(5) Use of cottonseed or soybean meal.

804.2 Minerals and Vitamins

(a) In some areas livestock may need such minerals as phosphorus, calcium, or magnesium trace elements, including, manganese, selenium, molybdenum, and iodine. To be effective, minerals should be made available to both mother and offspring.

804.2(a) Continued

(1) Phosphorus supplements include dicalcium phosphate, steamed bonemeal, and polyphosphate mixture, normally fed in mixture of one part of salt to two parts of supplement.

(2) If phosphorus is supplemented, calcium needs of the animals are usually satisfied.

(3) Magnesium can be supplemented by feeding a 1:1 mixture of magnesium oxide and salt, a three-part mixture of equal amounts of magnesium oxide, salt, and bonemeal, or a four-part mixture of equal amounts of salt, magnesium oxide, bonemeal, and cottonseed meal.

(b) Vitamin A is often needed if animals graze mostly dormant, dry vegetation. The intermuscular injection is effective in providing sufficient amounts of vitamin A. It generally provides sufficient vitamin A for a 3-month period.

(c) Local needs should be established, as applicable, relative to the kinds and amounts of mineral required.

805 CONTROL OF LIVESTOCK PARASITES AND DISEASES

Effective control of parasites living in and on livestock is needed for efficient livestock production. Some tools that aid in controlling parasites and diseases are:

--A grazing system designed to use grazing units or pastures during different seasons in subsequent years or in the same year to help in disrupting the cycle of internal parasites.

--Clean water.

--Calving, lambing, or kidding at a period of the year when losses from parasites can be reduced.

--Adequate control programs to reduce parasite problems.

--Cattle dusters, backrubbers, and other insect-control devices. (These devices often help to improve grazing distribution and to control livestock movement.)

806 REGULATING THE BREEDING SEASON

806.1 Controlled Breeding Program

(a) General. For efficient use of forage, a breeding program should be compatible with the existing (or planned) forage production program. By controlling the time of breeding, the period of optimum growth for the animals to be marketed can be synchronized with the period of peak quality and optimum growth of forage as shown in exhibit 806.1. The local climate is often the limiting factor when attempting to correlate the breeding and forage production programs.

Although SCS personnel are not to make an issue of this fact, they should call to the attention of livestock producers the opportunities that controlled breeding provides.

(b) Advantages of controlled breeding. Among the advantages of controlled breeding are:

(1) Offspring are generally heavier at a given age and are in a better bloom at market time if they can graze throughout the growing season.

(2) Females are usually in better condition when they go onto mature forage. The herd winters with less care, and the need for supplemental feed is reduced. Also, concentration of livestock in given areas is reduced, and the risk of overuse of and damage to forage plants is less.

(3) Animals are more uniform in size and quality at market time and generally demand better prices.

(4) Barren and sterile animals can be identified and eliminated rapidly.

(c) Factors to be considered in planning a breeding program. In planning a program of controlled breeding, the following are important considerations:

806.1(c) Continued

(1) Birth of offspring should be scheduled to occur when adverse climatic conditions are likely to be minimal.

(2) Variability in breeds and in the ability of their young to adjust to adverse clim conditions.

(3) Parturition should occur when the chances of seasonal diseases and parasite probl are less likely.

806.2 Noncontrolled Breeding

Many livestock producers leave males and females together throughout the year. Among the d advantages of this practice are:

(a) Less efficient use of vegetation,

(b) Lower calving and lambing rates and greater difficulty in culling slow breeders,

(c) Higher labor costs,

(d) Greater feed costs,

(e) Less efficient marketing because of nonuniformity in size of animals, and

(f) Greater difficulty in manipulating livestock in planned grazing systems.

806.3 Breeding Season for Ewes and Nannies

Ewes and nannies are generally bred within a 60-day period (three heat cycles). Lambs and kids should be old enough at the time of vegetation green-up date to enable them to use th increased milk produced by their dams and to take advantage of the forage. If controlled breeding is practiced, one buck or billy is generally enough for every 25 to 30 ewes or nannies.

806.4 Breeding Season for Cattle

A realistically uniform calf crop can be obtained if the breeding period is limited to 60 90 days (3 to 4 heat cycles). Calving should start 60 to 90 days before the grass green-u date. The calves can thus take full advantage of increased milk production, and the cows will be in condition to breed back. Breeding must start within 85 days after calving, or calves will be born progressively later each year. If controlled breeding is practiced, o sire is generally adequate for every 20 to 25 females. The number of cows per bull ranges from 15 to 30 depending on the age, condition, management, libido, and semen quality of th bull; the size, condition, and topography of the pasture; and the distribution of the wate supply.

Artificial insemination is becoming common in the commercial cattle industry. A followup bull is generally used with each 100 cows to breed those that fail to conceive at first service.

806.5 Reproduction Characteristics of Domestic Animals

Species	Heat period	Heat cycle	Gestation period	Female per male
		Days	Days	Number
Horses	6-7 days	22	336-340	15-30
Cattle	12-18 hrs	19 1/2-21	283	25 avera
Sheep	29-36 hrs	17	142-150	25 or mo
Goats	24-26 hrs	20-22	151	25 or mo

Age of puberty (U.S. conditions):

Horses.....Second spring (yearling)
Cows.....5-13 months (depending on breed and condition)
Sheep.....First fall
Goats.....7-8 months

806.6 Breeding for Two Calving and Lambing Seasons

This practice consists of dividing the breeding herd into two groups. One group is bred to calve or lamb in the fall and the other in the spring. Advantages include the need for fewer males and reduced labor requirements. This practice also permits two marketing periods.

806.7 Additional Factors to be Considered in Livestock Breeding and Selection

All livestock should be bred, raised, and performance tested under the environmental conditions in which they are to be used. Because of the effects of heterosis, crossbred females usually reach productive ability at an earlier age, reproduce more regularly, and live longer, more productive lives than straight breds of similar quality. Improved milking and mothering ability is another advantage of planned crossbreeding programs.

In selecting breeding animals for range and pasture, the following significant qualities should be considered·

(a) Disposition,

(b) Fertility,

(c) Weight,

(d) Conformation,

(e) Hardiness, and

(f) Milk production capability.

807 LIVESTOCK NUTRITION AND MANAGEMENT GUIDANCE

807.1 Nutrient Needs of Animals

Animals need a variety of nutrients, which are grouped as follows:

(a) Carbohydrates and fats--provide energy for growth, maintenance, and production. Energy deficiency is a major problem and usually occurs when animals do not get enough to eat. Increasing the animals' total feed intake can bring about dramatic recovery from many "so-called" minor element deficiencies and diseases.

Maintenance requirements for dry animals are significantly less than those for lactating animals. About 20 days after an animal gives birth, the megacalories of energy required are 150 percent of those required before parturition. The needs of mother and offspring immediately before weaning are 200 percent of those of the dry mother.

(b) Proteins--principal constituents of the organs and muscles. Pro[illegible] a major problem. If an animal has an energy deficiency, a lack of pro[illegible] vates the condition. Protein supplement is often mistakenly advocated [illegible] (carbohydrates and fats) intake should be increased.

(c) Vitamins and minor elements--needed in small quantities to regul[illegible] nutrients.

(d) Minerals--constituents of bones, teeth, and other organs.

(e) Water--water quality and availability have nutritional implicati[illegible] or poor-quality water causes poor livestock performance.

807.2 Nutritional Deficiencies in Animals

There are two primary causes of nutritional deficiencies in animals: t[illegible] poor management and feeding practices, and those caused by low-quality mineral deficiencies in the soil.

807.2 Continued

Nutritional deficiencies resulting from low-quality forage can be corrected rapidly by supple mental feeding, as discussed in 804.

Correcting soil deficiencies by applying the needed minerals requires time for the soil and plants to respond before the nutritional deficiency is corrected.

807.3 Ability of Cattle to Adjust to Fluctuating Forage Quality

The stomach of the domestic cow reaches full size and maturity by the time the animal is 4 to 5 years old. The size of the stomach and associated organs is dependent on the nutrition level of the plants the animal grazes during this growth and development period. In areas where the nutritional level of plants is low, the stomach of a mature cow may become large enough to hold 40 to 50 lb of air-dry forage per day to meet the nutritional needs of the animal. In areas where the nutritional level of vegetation is high, the cow's stomach is small because only 20 to 30 lb of air-dry forage is required per day. The significance of these factors to livestock operators is:

(a) If the nutritional level of vegetation is low, more pounds of forage are needed per da to support an animal.

(b) If domestic animals of any age are moved from a pasture of low-quality vegetation to one of high-quality vegetation, the performance response of the animals will be excellent.

(c) If a mature animal is moved from a pasture of high-quality forage to one of low-qualit forage, there is a rapid decrease in the digestible protein fraction of the forage the anima must consume. Approximately a year may then be needed for adequate gut expansion for handli a compensating volume. The performance of the animal will be poor during this time lag. Th young animal's performance may never become satisfactory until the animal reaches maturity.

807.4 General Feeding Rules

(a) Substitute 3 lb of corn silage for 1 lb of alfalfa-grass hay.

(b) Substitute 3 lb of alfalfa-grass hay for 1 lb of grain.

(c) Feed 2 lb of hay per day per 100 lb of body weight of ruminant animals (for maintaini body weight). Example: 20 lb of grass hay per day for a 1,000-lb cow. Depending on the quality of grass hay, supplemental protein may be needed.

(d) Breeding ewes can be wintered on good roughage alone. On low-quality pasture, they w produce better if fed ½ lb of grain per head per day for 4 weeks before and 2 weeks after lambing.

(e) During winter feeding, provide warm drinking water in cold areas so that energy from the animal's body is not needed to warm the water. Livestock will then drink more water, which improves general health and performance.

(f) Provide sheds or windbreaks to keep livestock from expending energy to maintain body temperature.

900 PROCEDURES FOR PLANNING WILDLIFE HABITAT MANAGEMENT ON NATIVE GRAZING LAND

901 GENERAL

Native grazing land supports many species of wildlife as well as domestic livestock. As residents and consumers, wildlife and their habitat must be properly managed if the land is to be used wisely and efficiently.

Some species of wildlife have become so greatly reduced in number, have such specialized habitat, or are so limited in distribution that they are threatened with extinction. The disappearance of any species would be an ecological, cultural, and, in some places, an economic loss. Wildlife fill a niche in the ecosystem of grazing land and contribute to environmental quality. SCS is to assist actively in the preservation of threatened and endangered species and is to avoid activities detrimental to them.

Some wildlife species have increased in number and range of occurrence largely because of conservation treatment of privately owned land and increased knowledge of wildlife management. In places, because of their economic importance, wildlife have almost replaced domestic livestock.

SCS helps land users evaluate the potential of their land for wildlife habitat. Conservationists are to assist land users in planning for maintenance or improvement of the habitat for the desired kinds of wildlife.

Biologists, plant scientists, recreation specialists, soil scientists, and range conservationists are to work as a team to prepare such local technical information as plant lists interpreted for wildlife use and other technical guide material. Wildlife habitat interpretations are to be included in descriptions of range sites, woodland suitability groups, and native pasture groups.

902 TECHNICAL ASSISTANCE TO LAND USERS HAVING OR DESIRING WILDLIFE ON NATIVE GRAZING LAND

Technical assistance to land users is to be provided according to the provisions in the National Handbook for Resource Conservation Planning. Procedures for providing this assistance include the following:

902.1 Determine Interest, Attitude, and Objectives of Land User Concerning Use of The Land for Wildlife

Discuss present and potential capabilities for producing the wildlife species to which the land is suited. Discuss income-producing opportunities if appropriate. Determine the species and relative abundance of wildlife present. Provide appropriate technical assistance on the basis of these determinations and within federal and state wildlife regulations.

902.2 Appraise Present Condition of Land and its Potential for Wildlife Habitat

(a) Determine the range sites and ecological range condition of rangeland, the woodland suitability groups and forage value rating for grazable woodland, and the native pasture groups and forage value rating for native pasture.

(b) Appraise the condition and potential of wildlife habitat, giving special attention to food, cover, and water for the wildlife species concerned.

902.3 Determine Specific Needs for Improving, Restoring, or Maintaining Plant Community and Habitat for the Desired Species and Level of Wildlife Production

(a) Evaluate year-round and seasonal food, cover, spatial needs, and critical nutrition periods for the specific wildlife species.

(b) Discuss grazing preferences and food needs and preferences of big game animals. Consider the critical nature of food and cover for migratory wildlife species. Use range site, woodland suitability group, or native pasture group descriptions that are interpreted for wildlife use and preferences.

(c) Evaluate extent and nature of grazing competition between livestock and wildlife. Determine their compatability.

(d) Assist the cooperator in determining whether his wildlife habitat is currently improving, being maintained, or deteriorating and why. This determination should include an evalu tion of current and past utilization of plant species and evidence of satisfactory reproduction and growth of species desirable for wildlife. Form SCS-416 (Rev.), "Judging Utilizatio Trend, and Condition of Browse Plants" (exhibit 1003.1(d)(5), can be used for evaluating tha part of the plant community where appropriate.

(e) Help cooperator determine the grazing use by big game grazing animals and other wildlife species that use his land. Consider the potential number on the basis of habitat and his management objective. Use federal and state game department estimates if available.

902.4 Evaluate Alternative Methods of Providing Treatment or Management Practices to Maintain, Improve, or Develop the Desired Wildlife Habitat

(a) Help cooperator plan the appropriate treatment for the desired habitat. Give adequate consideration to the conservation needs and wildlife potential of the land. Examples of such treatment are planned systems of brush management such as prescribed burning to obtain a desirable combination of herbaceous and woody species; use of seed mixtures that produce plants beneficial to wildlife; manipulating kind of livestock, season of use, and intensity of use with a planned grazing system to provide required food and cover at critical times and locations for wildlife; and the development of watering facilities.

(b) Help cooperator plan for proper grazing use by livestock and wildlife species, balanced forage supplies for both wildlife and livestock, meeting needs of migratory big game animals and waterfowl, and variations in forage production by having flexibility in numbers of game animals and livestock.

(c) Discuss the desired level of harvest of game birds and animals. There are frequently opportunities for making adjustments by:

(1) Cooperative efforts between state and federal game management agencies and landowner aimed at adjusting bag limits and hunting seasons.

(2) Leasing trespass rights to hunting clubs or other interested groups.

(3) Arranging for guide services and lodging for hunters.

(d) Plan other appropriate practices or treatments needed to achieve the wildlife objective of the land user.

902.5 Provide Followthrough Assistance

(a) Provide technical assistance to cooperator in applying practices and implementing the total conservation plan.

(b) Assist cooperator in checking habitat periodically to evaluate trend in habitat components.

(c) Assist cooperator in checking for proper utilization of key wildlife forage or browse species. Section 1000 gives details concerning utilization checks.

1000 MANAGING PLANT COMMUNITIES

1001 GENERAL

Use and management of native grazing land must revolve around use and management of plants. The measure of productivity for grazing land is not the number of animals nor the number of acres but the amount and quality of plants. Plants are the crop produced on grazing land. Animals merely harvest the crop and convert it into meat and fiber. Although plants are managed chiefly through the manipulation of grazing animals, such management must be based on the needs of the plants.

Plants manufacture food in their leaves and green stems from the minerals and water they take from the soil and from elements in the air. The sun supplies the energy. Perennial plants use manufactured food for maintenance, growth, and reproduction and as a reserve for resuming growth following defoliation or dormant periods. Vigorous plants produce more top growth (photosynthetic tissue) than they need to manufacture food for their maintenance and reproduction. It is this surplus growth that can be safely harvested by animals. If too much photosynthetic tissue is repeatedly removed from plants by overgrazing or clipping, growth is impaired and plants become less vigorous, less competitive, and more susceptible to damage by drought, heat, insects, or disease. Eventually the plants die.

Plants continually compete with each other for moisture, sunlight, nutrients, and space in which to grow. Healthy plants are better competitors than unhealthy ones. The proper degree of grazing use plus occasional rest during critical periods of growth are essential to efficient production and desirable changes in plant communities. Regardless of any other treatment that may be applied to grazing land, the physiological needs and requirements of plants must be met if the land is to remain productive.

1002 CATEGORIES OF PRACTICES

Conservation practices commonly employed in the management and treatment of native grazing land are grouped into three categories to reflect their major purposes:

--Vegetation management practices are directly concerned with the use and growth of plants. They include proper grazing use, deferred grazing, and planned grazing systems.

--Facilitating practices control or influence the movement and handling of grazing animals and make it easier to apply vegetation management practices. Facilitating practices include water developments, stock trails, walkways, fencing, salting, and herding.

--Accelerating practices, which supplement vegetation management, help to achieve desired changes in the plant community more rapidly than is possible through vegetation management alone. Included are such practices as seeding, brush management, fertilizing, water spreading, prescribed burning, and certain mechanical means of treating the soil.

Definitions, standards, and specification guides for each conservation practice are provided in the National Handbook of Conservation Practices. Field office technical guides provide detailed specifications applicable to the conservation practices discussed. The paragraphs that follow provide procedural and background information for these practices.

1003 VEGETATION MANAGEMENT PRACTICES

1003.1 Proper Grazing Use

Proper grazing use is grazing at an intensity which will maintain enough cover to protect the soil and maintain or improve the quantity and quality of desirable vegetation. This practice applies to all native grazing land grazed by domestic livestock or by game animals.

(a) Establishing management objectives. Grazing values of plant communities vary according to the kinds of animals grazed and the seasons of use. Near-climax condition is often the management objective. There are times, however, when such a plant community is not the goal. For certain kinds of native grazing land, for some kinds of animals, and for certain seasons of use, a plant community somewhat removed from climax may provide adequate soil protection and, at the same time, produce the desired amount and kind of forage. For most pastures or grazing units, there are several management alternatives that include:

(1) Maintaining a near-climax plant community,

(2) Restoring near-climax condition, or

(3) Perpetuating a plant cover that is somewhat different from that of the climax. Th objective applies only when this kind of plant cover provides soil and water conservation a produces adequate amounts of good-quality forage, at least seasonally, for the grazing ani- mals.

(b) Key grazing areas and key species. Each pasture or grazing enclosure is the manageme unit for grazing land. Every management unit has certain characteristics that influence th distribution of grazing. Among these characteristics are soil; topography; size of pasture location of water, fences, and natural barriers; and the kinds and distribution of plants. In addition, weather conditions, location of salt and minerals, and habits of the grazing animals affect the pattern of grazing use. For these reasons, it is impractical to prescri grazing use for every part of a large grazing unit or to prescribe identical use for all pa tures of a farm or a ranch. It is more practical to determine the key grazing area(s) in each pasture and to plan grazing use to meet the needs of the plants on the key area. If t key grazing area of a pasture is properly grazed, the pasture as a whole will not be exces. sively used.

Most plant communities in a pasture consist of several to many plant species in varying amounts. Even though the entire plant community is a concern of management, to attempt to attain the desired use of every species would be impractical. It is more practical to ide tify a single species (or in some situations two or three) as a key species to serve as a guide to the use of the entire plant community. If the key species on the key grazing are is properly used, the entire plant community will not be excessively used.

(1) Characteristics of a key grazing area. A key grazing area:

(i) Provides a significant amount, but not necessarily the greatest amount, of the available forage in the pasture.

(ii) Is easily grazed because of even topography, accessible water, and other favo able factors influencing grazing distribution. Small areas of natural concentration, such those immediately adjacent to water, salt, or shade, are not key grazing areas, nor are ar remote from water or of limited accessibility.

(iii) Generally consists of a single range site, woodland suitability group, nati pasture group, or a part thereof.

(iv) Is usually limited to one per pasture. More than one key grazing area may b needed for unusually large pastures, pastures that have very rough topography or widely spaced water where animals tend to "locate," when different kinds of animals graze the pa ture, or when the pasture is grazed at different seasons. The entire acreage of very sma pastures can be considered the key grazing area.

(v) On grazable woodland, key grazing areas are frequently treeless openings or "parks" interspersed with wooded areas. For some woodland, native pasture, and brushy rangeland, the key grazing area is the "edge" between thick cover and more open land.

(2) Selecting key grazing areas. Key grazing areas should be:

(i) Selected only after a careful evaluation of the current pattern of grazing us the pasture.

(ii) Changed when the pattern of grazing use is significantly modified because of changes in season of use, kinds or classes of grazing animals, pasture size, water suppli or other factors that affect grazing distribution.

(3) Characteristics of key species. A key species generally:

(i) Is highly palatable. A relatively higher grazing preference is exhibited for by the kind of grazing animal and for the planned season of use than for associated speci in the key grazing area. (Very palatable plants that have a negligible production poten

should not be selected as key species.)

(ii) Provides more than 15 percent of the readily available forage in the key grazing area. A species providing less than 15 percent of the available forage can be selected as the key species if it has a potential for greater production or if it is critical to the needs of grazing animals. A choice browse species on deer winter range is an example of such a species. Selection of this kind of species usually necessitates a reduction in the stocking rate, however, and additional measures may be needed to hasten an increase in the desired species.

(iii) Is consistent with the management objectives for the plant community. If the objective is to maintain or improve the plant community to a relatively high ecological condition, the key species should be one that is a major component of the climax plant community.

(iv) Is a perennial, except where the grazing land is managed specifically for the perpetuation of annual vegetation or where the pasture has only annual species or a mixture of annuals of good forage value and perennial species of little or no grazing value.

(4) Selecting key species. Key species should be selected only after the decisionmaker:

(i) Chooses his key grazing area and evaluates the present plant community.

(ii) Decides the kind of plant community that will be the goal of management.

(iii) Gives due consideration to planned kinds and classes of grazing animals and the season of use.

(iv) Thoroughly evaluates the factors affecting grazing distribution. If only one species of animal grazes the pasture, a single plant species generally will suffice as the key species for judging use in a key grazing area.

(c) Defining proper degree of grazing use for key species. The objective of grazing management is to maintain or develop the kind of plant community that meets the goals of the decisionmaker and that is within the capability of the land. The condition and trend in condition of the plant community is the major concern. Attaining a specified degree of use of key plant species in key areas is not an objective. The degree of use specified for key species is merely a guideline or reference point by which the welfare of the plant community can be evaluated. The following should be considered in defining degree of grazing use:

(1) Specifications for the degree of use of native plant species should be based on the best locally adapted research data and on local experience of the conservationist and rancher.

Research and experience indicate that the amount of use that native plants can tolerate varies greatly according to the kind of plant, season of use, soil, climate, recent weather conditions, vigor of the plants, and amount of use to which competing species are subject. In general, research and experience show that most native herbaceous forage plants remain vigorous and productive if at least 50 percent of the annual production, by weight, remains at the end of the grazing season.

(2) If a pasture is grazed mainly during the dormant season, use generally should not exceed 60 percent of the annual growth, by weight, of key grasses and forbs.

(3) Unless more specific local information is available, not more than 65 percent use should be prescribed for key browse species. This degree of use applies to the annual growth of twigs and leaves within reach of animals. If deciduous browse species are used during the dormant season, the degree of use suggested applies to annual twig growth only.

(4) Recent research indicates that a significantly greater percentage of annual growth can be safely removed from many native plants if pastures are grazed at a high intensity for short periods and completely rested for longer periods, particularly if all plants growing in association are harvested. Extreme care must be exercised in applying such research results to insure that vegetation and conditions on which the data are based are similar to those for which specifications are being established. Temporary heavy use must be compatible with the management objectives and must not contribute to site deterioration.

(5) If pastures or grazing units contain significant amounts of both warm- and cool-season forage plants, key species and key grazing areas may need to be changed when the grazing season is changed and as grazing periods are rotated in a planned grazing system.

(6) If two or more kinds of animals make significant use of a pasture and their forag preference or grazing patterns differ, specifications for season of use and proper grazing use should be determined for each kind of animal, which includes selecting appropriate key grazing areas and key species, as needed.

(7) The degree of use for most pastures is to be expressed as the percentage removal, weight, of the key species in the key grazing area(s). Estimates of the percentage removal based on the total production of the key grazing plants for the growing season.

(8) The degree of use on annual ranges of the Mediterranean-type climatic zone can be expressed in pounds of current growth left as residue.

(9) For certain perennial plant communities, the appropriate degree of use can also b expressed in pounds per acre of annual growth remaining at the end of the grazing season i

(i) The plant community is dominated by a single plant species of high forage valu that is uniformly distributed in the pasture.

(ii) The management objective is to perpetuate that species as the dominant.

(iii) The resulting cover provides adequate soil and moisture protection.

(iv) Research or reliable data based on local experience are available for guidanc

(10) The amount of growth left on a perennial plant, not the amount removed, is impor tant to the functioning of the plant. During an exceptionally favorable year, there is us ally little advantage in leaving one-half of the annual growth of a vigorous plant when mu less than one-half might maintain the plant. During an unfavorable growing season, howeve removing one-half of the annual growth of a weakened plant may severely damage it. It wou be desirable to base grazing specifications on the amount of growth left on a plant if the were a practical method of doing so.

Under the conditions listed in c 8 and 9, the residue procedure can be fairly easily applied. In most plant communities, however, species are neither equally abundant nor uni formly distributed, and they do not have the same ecological status. Thus, a specificatio based on weight per acre would be impractical. Until a workable procedure is developed, except as noted in c 8 and 9, grazing use specifications are to indicate the percentage of annual growth that can be removed from the key plant species in key grazing areas.

(11) Form SCS-RANGE-414, exhibit 1003.1(c)(11), is useful for recording planned utili tion specifications for key species in key grazing areas. It is also useful for recording data concerning actual grazing use for future comparisons.

(d) Methods for determining utilization by key species. The main purpose for determinin utilization is to decide whether adjustments are needed in grazing management. Determinin the actual use made of key grazing areas is only one of the factors considered in assessin plant communities. Other factors are ecological condition and trend.

The degree of use of one or a few key plant species in a key grazing area does not measure total amount of forage that grazing animals consume. If the key species and key grazing ar are correctly selected, it is an index to the degree of grazing use of the total plant comm nity. The following methods are to be used in determining forage utilization:

(1) Weight comparisons of grazed versus ungrazed plants. Ungrazed plants of the key species occurring in movable exclosures, located in key grazing areas at the beginning of t grazing season, are cut and weighed. The weight of these plants are then compared with tha of grazed plants of the key species clipped near the exclosures. As an alternative, the clipped weight of grazed plants can be compared with that of ungrazed plants of the key species selected at random in the key grazing area. If ungrazed plants of the species are not available, ungrazed plants from the nearest comparable location can be used.

(2) Determining percentage of grazed versus ungrazed plants. This method applies where evaluations relating the percentage of grazed versus ungrazed plants of a species to the percentage removal by weight have been determined locally. After the percentage of grazed versus ungrazed plants of the key species in the key grazing area is determined, the percentage removal is determined with the aid of charts and graphs prepared during previous evaluations.

(3) Use of grazed-class photo guides. In some locations, series of photographs illustrating various degrees of grazing use, expressed in percentage by weight, are available for some plant species. Guides based on actual clipping and weighing of plants of the key species provide a relatively simple and rapid means of determining approximate grazing use. Such guides should be used only in the locality where they are prepared and only for the plant species specifically appraised. The procedure is to visually compare a series of plants of the key species with photographs illustrating various degrees of plant use and to tally the number of plants occurring in each grazed class. Extremes in growing condition must be considered when using photo guides.

(4) Ocular estimates of percentage grazed. Qualified conservationists who are trained and experienced in making actual weight comparisons of grazed versus ungrazed plants can make ocular estimates of the percentage removal of key species in a key grazing area. If this method is used, it is important to demonstrate the actual weight procedure to the cooperator in one or more pastures.

(5) Determining utilization of browse plants. Even though the degree of utilization of current growth of browse plants is an important factor, it does not provide all the information needed for properly planning and managing range for use by wildlife or livestock. Moreover, it is impractical to make current utilization estimates at such times as during the early part of the growing season or before current use has taken place on seasonal range.

In addition to the degree of utilization of current growth, several other indicators are of value in appraising the general trend in condition and production of a stand of browse plants. These indicators often reveal more about the stand than current utilization alone. Also, they can be observed and interpreted at any time of the year. Among these factors are:

(i) Age classes of key plant species. Age class is probably the most important single factor in judging trend in a stand of browse plants. If all plants are mature, the stand is not maintaining itself and will thin out as older plants die. The presence of adequate numbers of seedlings and young plants of the key species is indicative of a healthy, self-perpetuating stand. Browse plants generally do not reproduce every year, but at least several age classes should be represented in a healthy stand. Animals usually prefer seedlings and young plants; consequently, a degree of use that may be proper for mature plants will often result in overutilization of younger plants.

(ii) Evidence of "hedging" of the key plant species. The degree of hedging reflects past use and also the productive ability of browse plants. Moderate hedging may be desirable for some species because it stimulates growth and keeps plants from growing out of reach of animals. Severe hedging results in the death of many branches and if continued for a long time may cause death of entire plants. If only a single year's growth extends beyond old hedged contours, recent use has been heavy. Parts of two or more year's growth beyond old hedged contours suggest that browsing pressure has recently been reduced and that trend is upward.

(iii) Use of plant growth more than 1 year old. Generally, when overall utilization is very heavy, browsing animals often consume parts of plants that are older than the current growth. Continued use of older growth results in rapid decline and death of plants.

(iv) Evidence of browse lines. If a browse line is readily apparent, plant growth within reach of animals has declined. Very distinct browse lines indicate that plants have already grown beyond the reach of animals. Such plants may be vigorous and productive because of unused growth above reach of animals, but they produce little or no available forage.

(v) Presence of dead twigs and branches. Some mortality of plant parts is normal, but excessive amounts of dead or weak limbs, branches, twigs, or even entire plants indicate that past use was too heavy and that the stand is deteriorating.

(vi) Relative size of plant parts. Light pruning or browsing often stimulates growth of leaves and sprouts to more than normal size. Continued heavy use, however, results in small and weak leaves, twigs, and fruiting stems. Repeated heavy use of sprouts gradually reduces their size. If properly used, species of root-sprouting ability produce sprouts following fire or other disturbances. Weakened plants will not. Overutilization reduces or eliminates fruit and seed production.

(vii) Significant use of low-preference species. Plants of low preference are ordinarily lightly used, unless species of higher preference are not available or have been too heavily used. If significant use is made of a species that animals ordinarily use sparingly or not at all, the key species is being abused.

(viii) Amount of reproduction of low-preference species. Excessive reproduction of low-preference species usually indicates that the key species has declined to the extent that it is unable to compete with other plants.

(ix) Condition of animals. The physical condition and reproductive ability of game animals or livestock reflect the amount and quality of plants available for forage. This indicator is not infallible because animals may remain in good condition for a while, even on seriously abused ranges, as long as succulent growth is available. Also, supplemental feeding of livestock often masks the effect of inadequate natural forage supplies.

No factor noted in d 5, by itself, is a completely reliable indicator of trend in condition. All evidence must be carefully evaluated as a basis for determining needed adjustments in management or stocking and for determining needed harvest of game animals using the range.

Form SCS-RANGE-416 (Rev.), a checklist for judging utilization and condition of browse plants, exhibit 1003.1(d)(5), is useful for recording and evaluating trend in stands of browse.

(e) Other considerations in determining utilization.

(1) Although the degree of use or the lack of use of each plant species in a pasture is of interest and affects the nature of plant communities in the pasture, determining the use of each species is neither practical nor essential.

(i) Averaging the degree of use of many species having widely different degrees of use and grazing preference values does not provide a meaningful answer to utilization or to the impact of such utilization on the plant community.

(ii) Nonuse or light use of a species of negligible grazing preference does not compensate for heavy use of a species having high grazing preference.

(iii) To determine the use status of a pasture, the acreage that is properly used and overused must be determined. The intent of the practice is to prevent excessive use of grazing areas, or at least to reduce the excessively used acreage to a reasonable minimum. Most grazed pastures have small areas of natural livestock concentration, such as those immediately adjacent to water, which often are excessively used even when the entire pasture is properly grazed. If areas of excessive use do not exceed 10 percent of the pasture, the pasture may be considered properly used.

(2) To determine the degree of grazing use of key species as part of a cost-share program or contract, make the determination at or near the end of the planned grazing period.

(i) For pastures grazed on a continuous yearlong basis, make the final determination shortly before the beginning of a new growing season. Utilization at that time should not exceed that specified in the contract.

(ii) For pastures grazed early every spring, rested in summer, and grazed again in fall, determine the degree of use at or near the end of each grazing period.

(iii) For pastures in a planned grazing system, determine use near or at the end of the planned grazing period of each pasture. If pastures are grazed more than once during a year, make the determination near the end of the last grazing period preceding the beginning of a new growth season.

1003.1(e) Continued

(3) A determination of degree of use at or near the end of the grazing period serves to indicate the final utilization of pastures. This is too late, however, to permit needed adjustments in grazing during the current season and is, in effect, a "post mortem" determination.

Conservationists should help cooperators make forage production and utilization determinations and trend observations well before the end of the scheduled grazing period, preferably before two-thirds of the period has passed. If determinations are made this early, enough time remains to adjust animal numbers or the length of the grazing period to avoid overuse of plants during years of poor production or to take advantage of extra forage in more favorable years.

(f) Utilization versus trend. As indicated earlier, the objective of good grazing management in most situations is to maintain an upward trend in condition. Therefore, if the trend on key grazing areas is downward, adjustments should be made in the use of the pasture, even though grazing use of the key species may be within prescribed limits. Likewise, if the trend in the plant community is continually upward, grazing is not excessive, even though it may exceed the amount prescribed for the key species. If such a condition occurs, utilization specifications should be reevaluated.

For pastures included in grazing systems, trend over a period of two or more years is usually a more meaningful indicator of the effectiveness of grazing management than is the degree of utilization of key species.

Factors of trend, discussed in detail in paragraph 307, apply equally to all kinds of native grazing land.

(g) Degree of grazing use as related to stocking rates. Because of fluctuations in forage production or loss of forage other than by grazing use, arbitrarily assigning a stocking rate at the beginning of a grazing period does not insure attainment of a specific degree of use. If the specified degree of use is to be attained and trend satisfactorily maintained, stocking rates must be adjusted as the amount of available forage fluctuates.

Guides to initial stocking rates in field office technical guides are based on general averages for individual range sites and grazing groups. These guides are without specific reference to the grazing distribution characteristics of individual pastures. For example, a Stony Hills Range Site that has steep areas adjacent to a relatively level Loamy Upland Range Site generally receives less grazing use by cattle than the Loamy Upland Range Site. The Stony Hills Range Site may produce enough forage to permit a stocking rate of 2 acres per animal unit per month when it is the only site in a pasture. Its grazing use, however, will generally be substantially less, under the conditions just described, by the time the Loamy Upland Range Site has been properly used. Therefore, initial stocking rates for a pasture should not be based directly on the initial stocking rate guides without a careful onsite evaluation of factors affecting grazing use of the entire pasture.

1003.2 Deferred Grazing

(a) Deferred grazing is postponing grazing or resting grazing land for a prescribed period. It is a companion practice to proper grazing use and is used when proper grazing alone will not achieve vegetation management objectives in a reasonable length of time. Deferred grazing helps to:

(1) Hasten natural revegetation by improving plant vigor and permitting desirable species to produce seed,

(2) Provide a forage reserve for off-season or emergency use, and

(3) Improve plant cover and hydrologic cover conditions and reduce soil loss.

(b) Local field office technical guides provide standards and specifications for deferred grazing.

1003.3 Planned Grazing System

(a) A planned grazing system is a system in which two or more grazing units are alternate rested from grazing in a planned sequence over a period of years and the rest period can be throughout the year or during the growing season of the key plants. Such systems help to:

(1) Maintain or accelerate improvement in vegetation and facilitate proper use of the forage on all grazing units,

(2) Improve efficiency of grazing through uniform use of all grazing units,

(3) Stabilize the supply of forage throughout the grazing season,

(4) Improve watershed protection, and

(5) Enhance wildlife habitat.

(b) Many different grazing systems are used in various places. Planned grazing systems a to be designed to fit the individual operating unit and to meet the operator's objectives a the practice specifications.

1004 FACILITATING PRACTICES

Facilitating practices help to control or influence the movement of livestock necessary for uniform distribution of grazing. Among the practices that aid in the distribution of livestock are: stock water developments, including farm ponds, spring developments, wells, troughs, tanks, and pipelines; fencing; salting; stock trails; cattle walkways; and herding.

Standards and specifications for these practices are available in the local field office technical guide. Use of these practices are discussed in section 800.

1005 ACCELERATING PRACTICES

When vegetation management alone does not achieve plant community management objectives with a reasonable length of time, one or more supplementary practices may need to be planned and applied to help accelerate the desired improvement. These practices often result in dramati changes in the plant community. Livestock tend to concentrate on areas where these practice have been applied and overutilize them if protective measures are not taken.

Overutilization can reduce or totally negate the benefits of the practice. For this reason, accelerating practices should be carefully planned and applied, taking into consideration th entire grazing unit. Details, including standards and specifications, for these practices are provided in the local field office technical guide.

The following accelerating practices should be considered, as appropriate: range seeding, brush management, prescribed burning, fertilizing, mechanical treatment, and waterspreading.

1100 COST-RETURN EVALUATIONS

1101 POLICY

It is SCS policy to use cost-return evaluations as a tool in planning alternative land uses and treatments. Cost-return evaluations are to be used to the extent necessary to help users of native grazing land select feasible alternatives.

1102 PRINCIPLES OF COST-RETURN EVALUATIONS

Cost-return evaluation assistance provided to landowners and land users through soil, water, natural resource, or other conservation districts helps them plan, establish, and evaluate alternative land uses and conservation treatments.

Cost-return evaluations are of value to local leaders (elected or appointed) who have the responsibility for developing programs and plans for the use and management of soil, water, and plant resources in a community, region, or project area, such as a soil and water conservation district (SWCD) or a resource conservation and development (RC&D) project.

Conservation cost-return information reflects relatively short planning periods, highly variable managerial ability, and risk factors. The base starting point is "present" conditions. "Future" conditions reflect costs incurred and anticipated returns based on the land use and conservation treatments being applied.

Residual returns based on an installed conservation program provide for "returns to land, management, and other unpaid items."

1103 PURPOSE

The purpose of cost-return evaluations is to:

--Encourage everyone concerned with planning and development of conservation programs to consider the economic impact that multiple or pertinent alternative land uses and treatments will have on individuals, groups, communities, or regions.

--Help the public understand and appreciate the direction a program of conservation and resource development should take for the overall benefit of the community.

--Make decisionmaker(s) aware of the present and potential values of native grazing land in relation to other potential land uses.

--Encourage the application of conservation plans by pointing out the economic advantage of applying conservation treatments in the proper sequence.

1104 TERMS USED IN COST-RETURN EVALUATIONS

Amortization, as used by SCS in cost-return evaluations, means paying a financial obligation or investment in equal annual installments (principal plus interest) at a given rate of interest for a given period of years. This is a means of reducing lump sum capital improvements to an annual cost basis.

The period of amortization should not exceed the life of the conservation measure or structure. If money is borrowed to make an improvement, the length of the loan determines the period of amortization. If the operator has the money, the real or potential alternative uses of capital determines the period of amortization. Generally, the operator will want to amortize his investment in the shortest time possible consistent with the benefits received. The interest rate is determined by the going rate charged by the local lending institutions.

The amortization factors given in the following table are for given rates of interest for given periods of time to retire a debt of $1.

Example: An operator borrows money to build a stock pond costing $465. He borrows this money for 5 years at 8 percent interest.

Solution: $465 x 0.25046 = $116.46 (the required annual payment).

1104 Continued

Exhibit 1104 is a worksheet for calculating amortized costs.

Amortization factors for common interest rates:

No. of years	6%	7%	8%	9%	10%	12%
1	1.06000	1.07000	1.08000	1.09000	1.10000	1.12000
2	.54544	.55309	.56077	.56847	.57619	.59170
3	.37411	.38105	.38803	.39505	.40211	.41635
4	.28859	.29523	.30192	.30867	.31547	.32923
5	.23740	.24389	.25046	.25709	.26380	.27741
6	.20336	.20980	.21632	.22292	.22961	.24323
7	.17914	.18555	.19207	.19869	.20541	.21912
8	.16104	.16747	.17401	.18067	.18744	.20130
9	.14702	.15349	.16008	.16680	.17364	.18768
10	.13588	.14238	.14903	.15582	.16275	.17698
11	.12679	.13336	.14008	.14695	.15396	.16842
12	.11928	.12590	.13270	.13965	.14676	.16144
13	.11296	.11965	.12652	.13357	.14078	.15568
14	.10758	.11434	.12130	.12843	.13575	.15087
15	.10296	.10979	.11683	.12406	.13147	.14682
16	.09895	.10586	.11298	.12030	.12782	.14339
17	.09544	.10243	.10963	.11705	.12466	.14046
18	.09236	.09941	.10670	.11421	.12193	.13794
19	.08962	.09675	.10413	.11173	.11955	.13576
20	.08718	.09439	.10185	.10955	.11746	.13388

Annual cost is annual amortized cost plus annual maintenance cost.

Suitable life periods refer to the useful life of improvements and conservation practices.

Suitable life periods of improvements and conservation practices vary greatly from one part of the country to another and in any given area because of differences in the kinds and quality of materials used and the condition under which a practice is installed. For these reasons, no suitable life periods are suggested. Suitable life periods are to be determined for each situation on the basis of the amortization schedule agreed to by the decision-maker(s).

05 DATA NEEDED TO MAKE COST-RETURN EVALUATIONS

05.1 Resource Data

A cost-return evaluation of livestock, wildlife, and recreation enterprises and the potentials for further development and/or improvement in an area involves interdisciplinary consideration of soil, water, and plant resources. Planners should have data on:

(a) Major soils of the area. These data should include interpretations indicating the potential of the soils for such uses as rangeland, woodland, cropland, wildlife, recreation, and other uses.

(b) Major problems and opportunities connected with land use and treatment. Included are range condition class, livestock distribution, season of use, watering facilities, unwanted brush, areas needing researching, yearlong feed and forage supplies for livestock and wildlife, erosion, and recreation.

05.2 Basic Livestock and Wildlife Data

Most alternative land uses and treatments are evaluated on the basis of their affect on cost return through animal performance. The cooperator must be willing to supply such basic information about livestock and wildlife as:

(a) Kind and number of animals;

1105.2 Continued

(b) Average weight of weaning calves, kids, and lambs at a given age, usually at sale time;

(c) Average weight of dry animals sold;

(d) Percentage of calf, lamb, and kid crop weaned;

(e) Average weight of wool or mohair per animal;

(f) Livestock management practices, including

(1) Breeding program,

(2) Calving, lambing, kidding, and

(3) Shearing;

(g) Kind and number of wildlife harvested;

(h) Method of herd replacement (raised or purchased); and

(i) Basic facts about animals and their performance that help planners to determine if a problem is related to livestock management or whether it reflects a need for adjustment in land use or treatment.

Basic livestock and wildlife data can be collected on form SCS-CONS-2 (exhibit 1105.2) or on any locally prepared worksheet for collecting and summarizing such data.

1105.3 Production Costs

Costs connected with the production of livestock, wildlife, forage, and recreation enterprises vary from one enterprise to another and from one section of the country to another. Therefore, obtain costs, if possible, from the individual operator(s) or use the average costs for the particular locale. The following guidance is for use in arriving at some of the major basic costs.

(a) Costs of accelerating and facilitating practices.

(1) Brush management. Amortize initial cost of brush manipulation plus annual maintenance.

(2) Range seeding. Amortize initial cost of seeding, including seedbed preparation and seeding. On sites where stands are difficult to establish, a risk factor should be added.

(3) Pasture establishment and maintenance.

(i) Pasture established before the conservation plan was developed. Charge only annual maintenance costs, which can consist of those for mowing, brush management, irrigation, fertilization, liming, and similar practices.

(ii) Pastures established after the conservation plan was developed. Amortize the cost of establishing the pasture, including costs for land clearing, seedbed preparation, seed, seeding, liming, and weed control plus annual maintenance costs.

(4) Fences.

(i) Existing fences. Charge annual maintenance costs.

(ii) New fences. Amortize initial cost plus annual maintenance costs.

(5) Water facilities.

(i) Old facilities. Charge annual maintenance costs.

(ii) New facilities. Amortize initial investment plus annual maintenance costs.

(b) Livestock and forage costs.

(1) Saddle and draft horses. Include in livestock inventory so it will become a livestock investment cost.

(2) Dogs (cow, sheep, and hunting dogs). Include in livestock inventory so it will become a livestock investment cost.

(3) Marketing. These costs include sales commissions, charges for hauling and yardage and brand inspection fees. Use actual selling costs, or use the standard rates charged by local auction markets. For trailer trucks equipped to haul livestock, charge by the mile; compute rate times distance.

(4) Shearing. Charge cost of custom shearing, which is usually by the head, plus ties and wool sacks.

(5) Veterinary and medicine. Use actual cost or average cost for the particular local

(6) Grazing permits or leases on public or private grazing land, including rangeland, grazable woodland, native pasture, or annual pasture. Charge actual annual costs of permi or leases.

(c) Feed and supplement costs.

(1) Feed and forage supplement.

(i) Purchased. Charge delivered prices.

(ii) Produced on farm or ranch. Charge actual cost of production, if known, or charge custom rates for the locality.

(2) Salt and minerals. Use delivered prices or average costs for the locale.

(d) Equipment and other facilities.

(1) Pickup and other equipment.

(i) Pickup. Charge enough per mile to cover depreciation, insurance, maintenance, and normal operation expenses. Mileage allowed by the Internal Revenue Service for income tax purpose is a good figure to use if actual cost of operation is not known. Charge rate per mile times actual or estimated miles driven.

(ii) Equipment other than pickup. Charge an hourly rate that covers depreciation, maintenance, etc. Hourly rates charged by local contractors is an alternative.

(2) Hunting lodges or cabins.

(i) Existing facilities. Charge annual maintenance costs.

(ii) New facilities. Amortize cost of new structures plus annual maintenance cost

(3) Corrals and other livestock-handling facilities.

(i) Existing structures. Charge annual maintenance costs.

(ii) New facilities. Amortize cost of new facilities plus annual maintenance cost

(e) Interest costs.

(1) Interest on investment in land. This is not a production cost item in comparing land use or treatment with another. This interest should be deducted from the net return from land and management.

1105.3(e) Continued

(2) Interest on investment in livestock. Charge interest on purchase price or replacement value of all livestock except calves that will be sold at weaning time.

(i) Borrowed money. The rate of interest will be the rate actually being paid the lender.

(ii) Family money. The rate of interest should be what this money can earn in other investments. Interest on family money becomes family income.

(f) Irrigation costs.

(1) Irrigation water. If water is purchased from an irrigation district, charge actual cost.

(2) Well irrigation.

(i) Existing facilities. Charge annual pumping costs plus maintenance costs.

(ii) New facilities. Amortize development cost plus annual maintenance costs and pumping costs.

(3) Irrigation systems.

(i) Existing systems. Charge annual costs for maintenance of dams, ditches, and structures.

(ii) New or revised systems. Amortize investment plus annual maintenance costs.

(g) Taxes.

(1) Land. Charge taxes on land used in the production of livestock and wildlife. Do not charge taxes on grazable woodland if they are charged against timber.

(2) Livestock. Show as a cost if taxes are paid. Some states do not tax livestock.

(h) Labor required to feed and manage livestock or harvest wildlife. Do not duplicate labor costs or costs of other production items.

(1) Hired labor. Charge amounts spent for wages, compensation insurance, and FICA taxes.

(2) Family labor. Estimate the hours worked by the family. Multiply hours by going rate for this kind of farm or ranch labor to arrive at family labor costs. To the extent that family labor is involved, it represents family labor income.

(i) Other. List all other costs not mentioned above that are connected with the particular type of operation being evaluated.

1105.4 Returns

There are different types of enterprises and combinations of enterprises from which monetary returns can be derived from native grazing land. The major types of enterprises are:

(a) Livestock. Livestock can consist of cow-weaning calf, feeder steers, cow-calf-yearling, stockers, mutton goats, nannie-kid goats, feeder lambs, ewe lambs, and others. For most all types of livestock enterprises, the forage resources are sold through livestock, so it is from the sale of livestock and livestock products that returns are calculated. On the majority of enterprises, the base herd remains quite constant and consists primarily of a breeding herd, replacement animals, and a given number of sires for a given number of females.

For these types of enterprises, the gross sales of livestock is the value used in determining returns from livestock in cost-return evaluations.

1105.4(a) Continued

When operators buy and sell livestock during the calendar year, the cost of livestock purchased must be subtracted from gross sales to arrive at returns from livestock. If operators hold an unusually large number of female animals or purchase additional breeding stock, or liquidate part of the breeding herd, the change in the value of the livestock inventory should be added to or subtracted from livestock sales to arrive at returns from livestock. The form shown as exhibit 1105.4,or one similar to it provides an orderly way of summarizing basic livestock data and calculating returns from livestock.

(b) Wildlife and recreation. In some areas, wildlife is the sole enterprise, and in others it is secondary to livestock. Operators who lease their land and water resources for hunting and fishing, receive financial returns from wildlife. The amount of money they receive from leases or fees is to be used in determining returns from wildlife.

(c) Other types of recreation. In addition to hunting and fishing, other types of recreation can be a source of financial return for operators of native grazing land. The public pays for such activities as camping, horseback riding, rock hunting, and hiking. When a cost-return evaluation is made for an operating unit, all income received from recreation that includes the use of the grazable resources is to be shown as returns from recreation.

(d) Forage. Forage that is sold as pasturage or surplus hay rather than through livestock or wildlife is a cash income and should be handled as a return to the operating unit.

1106 USING RANCHER EXPERIENCE IN COST-RETURN EVALUATIONS

Information based on experience is essential to the effective use of cost-return evaluations for planning. For this reason, data should be collected from representative operations where good livestock management and conservation programs are being applied. The operators must have good records and be willing to make them available. Data should be collected over a long enough period and from a sufficient number of operations to establish a reliable index of the productive potential of the grazable resources. SCS-CONS-2 (exhibit 1105.2) can be used effectively for this purpose.

1106.1 Use of Cost-Return Evaluations As a Planning Tool

A cost-return evaluation of land use and treatment should be based on annual costs and returns for the entire area or for the individual operating unit being evaluated for planning purposes. The cost-return evaluation should compare the present situation with proposed alternatives for solving problems or developing resource potentials and provide the basis for making sound decisions.

(a) First, evaluate the present situation. Until this evaluation is made, there is no base for determining the probable effect of any proposed changes.

(b) Second, evaluate the alternative land uses and treatments that will solve existing problems or improve resource potentials.

Costs and other values applicable to the local area and pertinent to the situation should be used in making these evaluations. The decisionmaker(s), however, must understand these costs and values and agree that they are meaningful to his situation.

There are various techniques for making these evaluations. They should be based on the problem or problems that exist and the practical solutions thereto. The important consideration is to provide understanding to the decisionmaker(s). How well this is accomplished will depend on the judgement and skills of the professional conservationist and on his knowledge and experience of the applied land use and treatments concerned.

1106.2 Use of Cost-Return Evaluations As a Preplanning Tool With Groups of Operators

Cost-return evaluations can be used effectively with groups of operators as a preplanning tool. Always keep in mind that the purpose of a group meeting is to stimulate thought and not to make decisions. Decisions are made when the conservationist works with the individual operator on his own place. Procedural steps are as follows:

(a) Invite several operators to attend and participate in a cost-return meeting.

1106.2 Continued

(b) Invite operators who have similar operations and similar problems.

(c) Assume a typical size and kind of operation as a basis for discussion and making a cost-return evaluation.

(d) Ask the group to identify problems connected with land use and treatments that they would like to have evaluated.

(e) Ask members of the group to furnish data on costs and animal performance. Let it be their meeting. The conservationist's knowledge of other operations can be used to guide the thinking of the group, but all members of the group should be involved as much as possible.

(f) Make use of every opportunity to teach group members the basic principles of native grazing land management so they can understand the economic advantage of applying these principles to their own operations.

1200 RESOURCE CONSERVATION PLANNING, PLAN IMPLEMENTATION, AND FOLLOWTHROUGH

1201 GENERAL

The National Handbook for Resource Conservation Planning discusses all phases of conservation plan development, implementation, and followthrough. This section provides additional guidance and emphasis concerning the aspects of planning, implementation, and followthrough that are peculiar to native grazing land.

1202 OBJECTIVES

Conservation planning helps users of native grazing land to more fully understand and evaluate their total resources. It helps them to have a greater appreciation for their role in managing a complex ecosystem and their responsibilities for protecting the environment and maintaining future options for use of the resources. Conservation plans for native grazing land include decisions for establishing and maintaining a cover of vegetation to protect the soil and permit efficient use of available moisture. Major planning objectives are proper grazing use and maintenance of sufficient cover to keep soil loss below the tolerable limits specified in local technical guides. (Engineering Technical Release 51 explains the use of the Universal Soil Loss Equation for estimating soil loss on native grazing land.) This cover provides forage for livestock or wildlife; enhances watershed conditions; and provides shade, ornamental, and esthetic or screening facilities.

When properly implemented, conservation plans for ranches and livestock farms benefit the individual operator, his community, and the nation. Well-managed native grazing land, along with the livestock and wildlife it supports, makes a major contribution to the natural beauty of the landscape and to the maintenance of a quality environment.

1203 DEVELOPING CONSERVATION PLANS

SCS assists the decisionmaker who owns or controls the land for which a conservation plan is being prepared. The decisionmaker makes the decisions. He does the planned work and pays for it. It is highly important that he understand that SCS is assisting him in preparing his plan.

1203.1 Role of Land User

Conservation planning is not productive until decisions have been made. Therefore, it is essential that the land user be encouraged to make decisions as soon as he is ready, willing, and able to do so. It is equally important, however, that he be discouraged from making firm decisions until he understands and has fully evaluated his resources and opportunities for their use.

Sometimes the development and implementation of a complete resource conservation plan is not needed or is not feasible. Range site and other grazing inventories with interpretations may be all that is required.

1203.2 Recognizing Opportunities

During the planning stage, the land user should become acquainted with the needs of his land and the potential opportunities for development of his resources. Often he is aware of some of the opportunities, but frequently a competent conservationist can point out additional resources and opportunities for his consideration. For example, a good wildlife habitat should not be overlooked because it lacks a wildlife population. Many potentially good habitats are not completely populated. Likewise, many decisionmakers have not considered the potential of their resources for such purposes as recreation. Also, they may not realize the full potential of their land for forage production.

1203.3 Developing Treatment Alternatives

There are generally situations that should be corrected, and there is generally more than one way to make the correction. Needs should be recognized and identified, and the conservationist should suggest alternative treatments. A common error is to suggest treatment before the land user fully recognizes the need for correction. The conservationist should be frank and businesslike. He should be tactful but should avoid "beating around the bush." Among the common situations that often need to be corrected are:

Situation	Alternative solutions or opportunities
Heavy use of key plants, low vigor.....	Proper grazing use, deferred grazing, planned grazing system, provide additional forage, reduce number of animals or grazing time, improve distribution of grazing.
Erosion, undesirable range condition.....	Seeding, proper grazing use, deferred grazing, planned grazing system.
Excessive low-quality brush.....	Brush management, proper grazing use, deferred grazing.
Livestock water inadequate or improperly spaced.....	Ponds, wells, springs, pipelines, troughs, tanks, rearrange pastures, change season of use.
Inefficient grazing distribution.....	Water development, fencing, salting, stock-trails and walkways, change kind or class of livestock, rearrange pastures.
Low production in dry years.....	Maintain forage reserve, maintain flexibility of herd size, buy or develop additional forage, adjust livestock numbers, lease additional grazing.

Initial stocking rates shown in technical guides serve only as guidelines and must be intelligently interpreted. If a range area has been heavily grazed in recent years or if it is subject to drought, an initial stocking rate lower than that shown in the guide is appropriate. If, however, the pasture has been lightly grazed or rested, moisture is adequate, and plant vigor is high, an initial stocking rate higher than that indicated in the guide can be considered. The proper stocking rate for a rangeland area that is barely in "fair" ecological condition can differ greatly from that for an area of the same range site that is in almost "good" condition. In addition to plant needs, combinations of range sites or grazing groups in a pasture or grazing unit, location and adequacy of water, topography, kind of grazing animals, watershed conditions, wildlife habitat needs, and many other factors influence selection of an initial stocking rate. This determination should be made "on the ground" in the pasture or grazing unit after considering all factors.

Often the best method of establishing the initial stocking rate is to assist the operator in making a trend study and utilization check on the key grazing area of the pastures or grazing units. The results of the trend study and use check, along with consideration of the kind of growing season, will indicate whether recent stocking for the pasture is too high, too low, or about right for the grazing period.

The amount and kinds of forage consumed by wildlife should be considered when establishing an initial stocking rate for livestock.

Seasonal availability of the kinds and amount of forage must be evaluated so that needed adjustments can be made in herd numbers and composition or in kinds of forage produced on cropland. Exhibit 1203.4 is an example of a worksheet for balancing "livestock, forage and feed." Such a form is to be used in developing resource conservation plans for all livestock operations except the less complex ones. Most states have a suitable form for this purpose.

1204 COORDINATED PLANNING

INTERAGENCY MEMORANDUM-7, (Rev.) outlines policies and procedures for providing coordinated planning assistance to livestock operators whose units include privately owned land and public land administered by the Bureau of Land Management and the Forest Service. Supplements to this joint memorandum have been published by states having significant acreages of public land.

1205 ASSISTANCE TO GRAZING ASSOCIATIONS AND OTHER GROUP-OPERATED RESOURCE UNITS

Groups afford an opportunity to work with several individuals at the same time. Association members often have individual holdings for which technical assistance is needed. INTERAGENCY MEMORANDUM-10 deals with the broad aspects of coordinating FmHA-SCS efforts. Specific needs are sometimes determined at the state level.

1206 FOLLOWTHROUGH ASSISTANCE

Operators need followthrough assistance in implementing their plans and in keeping them up-to-date. No matter how carefully a conservation plan is prepared, it does not result in conservation accomplishments until it is implemented. Every operator needs and is entitled to followthrough assistance in applying the provisions of his plan and in revising his plan to reflect changes in needs and objectives.

Most plans must be modified as forage resources are developed, land use changes are made, productivity increases, effects of drought or other disturbance become apparent, economic factors change, relative demand for products from the land change, or for many other reasons. Although the original resource inventory and plan represented the best combined judgment and experience of the operator and the conservationist, adjustments may be needed during application of the plan. Improved techniques or changes in forage production resulting from good management may also justify revisions. Therefore, both the inventory and the resultant conservation plan must be studied periodically, evaluated critically, and updated as needed.

Followthrough assistance is particularly important when the operator is applying his grazing management practices. Onsite assistance in applying such practices as seedbed preparation, seeding, brush management, and mechanical treatment is also important until the operator gains sufficient experience in applying such practices.

1206.1 Analyzing Need for and Scheduling of Followthrough Assistance

Because other program demands for assistance limit the time SCS has available for followthrough, needs of landowners must be carefully analyzed. Assisting the cooperator gain proficiency in effectively implementing his conservation plan with a minimum of onsite assistance, is a major objective. Timing of assistance for maximum effectiveness is a primary consideration when scheduling followthrough. For example, assistance in applying grazing management practices should be provided before the end of the planned grazing period. This allows the landowner to make needed adjustments in the number of annimals or in the length of the grazing season.

Generally, in scheduling followup assistance, priority should be given to:

(a) New cooperators beginning to implement their plans usually need help in evaluating degree of use, current trend, and guidance on livestock-forage balance. They may need such help two or three times during the first year, usually after each major plant growth period.

(b) Cooperators beginning a planned grazing system usually need assistance and encouragement. Followthrough assistance is particularly needed during the latter part of the grazing period for each pasture or unit until the system has gone through a complete cycle.

(c) Cooperators who are not applying good grazing management practices often need encouragement and guidance, or perhaps their plans need adjusting to eliminate problems.

(d) Grazing associations and other group-operated resource units require followthrough assistance to promote confidence and accord among various members who may differ in objectives and ideas. Such groups afford an opportunity to work with several individuals at the same time. Individual association members usually have individual holdings.

(e) Operators of lands included in Watershed and Resource Conservation and Development (RC&D) projects, the Great Plains Conservation Program, and other long-term cost-sharing agreements require timely followthrough assistance. The conservationist should review with the operator the basic principles of resource management and use during all forms of followthrough assistance.

1206.2 Support for Effective Followthrough

Effective followthrough assistance is possible if:

(a) District supervisors provide needed leadership and participation.

(b) District cooperators are adequately informed concerning the use of followthrough assistance in meeting their needs.

(c) SCS line officers give sufficient attention and proper emphasis to applying native grazing land management practices.

(d) Annual plan of operations (APO's) for states, areas, and field offices realistically provide for scheduling adequate followthrough assistance.

(e) Conservationists maintain proficiency and confidence in working with cooperators, especially in applying grazing management measures.

(f) Firm appointments are made with cooperators. It is often best to agree on a date in advance and then follow up with a "reminder" shortly before the date.

1207 SCS BENEFITS FROM FOLLOWTHROUGH

Effective followthrough assistance not only benefits the operator and the land but provides the following useful information to SCS: data for progress reporting, additional information concerning benefits of conservation treatment, information for use by district supervisors in conducting district programs, information for news items and feature stories, actual use records on grazing land, and records of decisions for use in revising conservation plans.

Experience gained by the conservationist from followthrough helps build his confidence and increases his proficiency.

Plant Association Table (First Assemblage)

/T means trace; dashes mean did not occur/

Species	Production at Location No.						
	1	2	3	4	5	6	7
	Pounds per acre (air-dry)						
bluebunch wheatgrass	910	1,190	1,690	960	1,380	1,260	1,620
Sandberg bluegrass	110	120	260	95	185	70	375
Thurber needlegrass	15	T	-----	15	-----	10	-----
needleandthread	10	-----	-----	10	-----	T	-----
cheatgrass	10	-----	T	---	-----	T	T
Pacific fescue	---	15	T	---	T	-----	T
squirreltail	---	-----	T	---	-----	T	-----
Idaho fescue	---	-----	400	---	460	-----	250
lineleaf fleabane	15	15	-----	20	-----	15	25
snow eriogonum	15	15	50	15	50	T	25
cluster phlox	15	25	-----	30	-----	15	-----
longleaf phlox	10	-----	50	25	50	T	25
yarrow	20	15	50	20	50	15	30
pussytoes	T	15	-----	---	-----	T	-----
arrowleaf balsamroot	---	-----	50	---	25	-----	50
hangingpod milkvetch	---	-----	25	---	25	-----	25
silky lupine	---	-----	25	---	25	-----	25
specklepod loco	---	-----	T	---	25	-----	25
indianwheat	---	10	-----	---	-----	-----	-----
tarweed	---	-----	-----	T	-----	T	-----
tapertip hawksbeard	---	-----	50	---	50	-----	25
filaree	---	-----	-----	---	-----	T	-----
gray rabbitbrush	10	T	T	5	T	15	T
gray horsebrush	---	-----	T	---	T	-----	T
Total	1,140	1,420	2,650	1,195	2,325	1,400	2,500
Soil Taxonomic Unit No.	1	2	3	1	4	1	3

Plant Association Table (Final Assemblage)

/T means trace; dashes mean did not occur/

Species	Production at Location No. 1	2	4	6	3	5	7
	Pounds per acre (air-dry)						
bluebunch wheatgrass	910	1,190	960	1,260	1,690	1,380	1,620
Sandberg bluegrass	110	120	95	70	260	185	375
Thurber needlegrass	15	T	15	10	-----	-----	-----
needleandthread	10	-----	10	T	-----	-----	-----
cheatgrass	10	-----	---	T	T	-----	T
Pacific fescue	---	15	---	-----	T	T	T
squirreltail	---	-----	---	T	T	-----	-----
Idaho fescue	---	-----	---	-----	400	460	250
lineleaf fleabane	15	15	20	15	-----	-----	25
snow eriogonum	15	15	15	T	50	50	25
cluster phlox	15	25	30	15	-----	-----	-----
longleaf phlox	10	-----	25	T	50	50	25
yarrow	20	15	20	15	50	50	30
pussytoes	T	15	---	T	-----	-----	-----
indianwheat	---	10	---	-----	-----	-----	-----
tarweed	---	-----	T	T	-----	-----	-----
filaree	---	-----	---	T	-----	-----	-----
arrowleaf balsamroot	---	-----	---	-----	50	25	50
hangingpod milkvetch	---	-----	---	-----	25	25	25
silky lupine	---	-----	---	-----	25	25	25
specklepod loco	---	-----	---	-----	50	50	25
tapertip hawksbeard	---	-----	---	-----	50	50	25
gray rabbitbrush	10	T	5	15	T	T	T
gray horsebrush	---	-----	---	-----	T	T	T
Total	1,140	1,420	1,195	1,400	2,650	2,325	2,500
	Site No. 1				Site No. 2		
Soil Taxonomic Unit No.	1	2	1	1	3	4	3

Exhibit 302.9A

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
_____, Utah Field Office

MOUNTAIN LOAM
RANGE SITE DESCRIPTION
MLRA - D-25 & D-28
June 1974
Approved by L. R. M.

A. PHYSICAL CHARACTERISTICS:

1. Physiographic Features

This site is on gentle to steep mountain slopes, on fans, in valley bottoms, and on mesas. In Utah, it is usually above the highest lake terrace of Old Lake Bonneville. Slopes range from 2 to 70 percent but generally are between 10 and 50 percent. The site occurs on all exposures. Elevation ranges from 5,000 to 9,000 feet; the higher elevations are in the southern areas.

2. Climatic Features

a. The climate is mainly moist subhumid or humid. Winters are cold and snowy, and summers are warm and dry. The average annual precipitation ranges from 16 to 22 inches. About 55 to 60 percent falls during the plant dormant period (October to March). This is the most dependable supply for plant growth. Lower precipitation and high evapotranspiration rates during July, August, and September cause slowing down in growth of all plant species and dormancy in most of the grasses and forbs.

b. Plants begin to grow from April 15 to May 1. The grasses are dormant from July 15 to August 15, but they may green up again in September when fall rains occur. Shrub species grow until frost though at a reduced rate during summer. Optimum growth period is during June. Frost-free period ranges from 70 to 130 days.

3. Original Native (Climax) Vegetation

a. This plant community is about 75 to 85 percent grasses, 5 to 10 percent forbs, and 10 to 15 percent shrubs, air-dry weight. Bluebunch wheatgrass dominates the plant community, making up from 50 to 60 percent of the total annual production on the site. Basin wildrye is the subdominant. Bearded wheatgrass, slender wheatgrass, big bluegrass, Sandberg bluegrass, and muttongrass are important indigenous components. Many other grasses and numerous forbs and browse plants add color to the site and variety to the diet of the grazing animals.

b. Relative percentage of total plant community by weight:

Grasses (75-85%)	Percent
bluebunch wheatgrass	50-60
basin wildrye	10-15
bearded wheatgrass	5-10
muttongrass	5-10
Sandberg bluegrass	2-5
slender wheatgrass	2-5
longtongue muttongrass	2-5
other	0-5

Forbs (5-10%)	Percent
arrowleaf balsamroot	2-5
daisy	2-5
horsemint	2-5
lupine	2-5
yarrow	2-5
other	0-5

Shrubs & Trees (10-15%)	Percent
antelope bitterbrush	2-5
big sagebrush	2-5
Gambel oak	2-5
mountain snowberry	2-5
other	0-5

Other plants are: bottlebrush squirreltail, Columbia needlegrass, Idaho fescue, indian ricegrass, Kings fescue, Kentucky bluegrass, Letterman needlegrass, mountain brome, needleandthread, nodding brome, oniongrass, trisetum, western wheatgrass, sedges, aster, astragalus, bastard toadflax, cutleaf balsamroot, bedstraw, eriogonum, geranium, goldenrod, groundsel, indian paintbrush, littleleaf sunflower, Louisiana sagewart, mulesear dock, peavine, penstemon, phlox, showy elkweed, stoneseed, tapertip hawksbeard, timber poisonvetch, yellow salsify, bigtooth maple, birchleaf mountainmahogany, chokecherry, littleleaf horsebrush, mountain lover, serviceberry, Woods rose, yellowbrush, threetip sagebrush, and rose.

c. If retrogression is cattle induced bluebunch wheatgrass, basin wildrye, big bluegrass, slender wheatgrass, and muttongrass decrease. Squirreltail, Idaho fescue, Kings fescue, mulesear dock, and several other forbs increase.

As the plant community continues to degenerate, big sagebrush, snowberry, Gambel oak, bigtooth maple, and littleleaf horsebrush dominate, and there is a sparse understory of the less palatable forbs and grasses.

Plant species likely to invade this site and become part of the plant community when it is in deteriorated condition are cheatgrass, sixweeks fescue, dandelion, knotweed, mullein, stickseed, annual forbs, rubber rabbitbrush, snakeweed, pinyon pine, and Utah juniper.

d. Vegetation density by ocular estimate 55 to 60 percent.

4. Annual Production

If the range is in excellent condition, the approximate total annual production ranges from 2,600 pounds per acre in favorable years to 1,200 pounds per acre in unfavorable years. Median production is approximately 1,800 pounds per acre, air-dry. Of this production, 10 to 15 percent will likely be unpalatable or out of reach of grazing animals.

5. Soils

a. The soils in this site are deep and well drained and have a dark-colored surface layer. The underlying layers are medium to fine textured and in places contain some gravel and cobbles.

These soils are on gently sloping to very steep mountain slopes and hilly plateaus. They formed in material weathered from sandstone, shale, limestone, quartzite, volcanic ash, and various igneous rocks. Intake rate is moderate to rapid, and water movement through the soil is moderate to slow. Roots penetrate the soils readily. These soils have a high water holding capacity, ranging from 10 to 14 inches in a 6-foot profile. Rock fragments are variable throughout the profile, but average less than 35 percent, by volume. Stones or cobbles may occur as a surface mantle. Under proper management, these soils have little surface runoff and slight or no erosion.

b. Major soils associated with this site are:

Ant Flat stony loam
Ant Flat loam
Barfuss silt loam
Harkers loam
Mable Mountain cobbly loam
Nebeker silt loam
Stoda loam

INTERPRETATIONS FOR:

s a high potential and provides excellent summer forage for sheep, cattle

on Service

2. Wood Products

This site has no potential for lumber. It has some value for fuel for campfires and fireplace wood from Gambel oak and bigtooth maple. These two species are used for fence stays and occasionally for fence posts. These species are sparse in the climax cover but often increase as range condition deteriorates.

3. Wildlife

This site has a high potential for wildlife habitat because of the great variety and abundance of grasses, forbs, and shrubs produced. This site is interspersed among dry croplands, woodlands, streambottoms, and their associated vegetation. This site provides habitat, at least for part of the year, for Gambels quail, sage grouse, blue grouse, ruffed grouse, song birds, golden eagle, bald eagle, cottontail rabbit, snowshoe rabbit, squirrels, mule deer, elk, moose, cougar, bear, and coyote.

4. Watershed (Hydrologic Interpretations)

Soils in this site are grouped into B and C hydrologic groups. They have moderately low to moderately high runoff potential. When hydrologic condition of the vegetation cover is good, the hydrologic curve number for the group B soils is about 64, and for the group C soils it is about 75. Refer to SCS National Engineering Handbook, section 4, to determine runoff quantities from these curves. When the hydrologic characeristic of the vegetation condition is less than good, field investigations are needed to determine hydrologic curve numbers.

5. Recreation and Natural Beauty

This site has many forbs and shrubs that bloom from early spring throughout summer and into fall. It has a combination of grasses, forbs, small shrubs, and large shrubs that offer good possibilities for screening. The site has high value for camping and picnicking areas. Hunting for upland game birds, snowshoe rabbit, elk, and mule deer is good to excellent on this site. Fishing opportunities are good in streams through and adjacent to this site. Summer home development is a possibility on this site, but detailed onsite investigations should be made to determine the suitability of the soils for septic tanks and sewage disposal facilities. Snowmobiling has high potential on this site.

6. Threatened and Endangered Plants and Animals

The golden and bald eagles inhabit this site at least part of the year.

7. Location of Typical Examples of the Site

a. State of Utah and Morgan SCD, valley bottoms by Frank Bohman's upper pond.

b. Wasatch SCD--plot 11, profile 135, photo No. 36, coordinates 6-5, on Dan Clyde's ranch near road to Witt Lake.

8. Guide to Initial Stocking Rate

Condition Class	Percent Climax Vegetation	Acres/AUM	AUM/Acre
Excellent	76-100	1.0 to 1.25	1.0 to 0.75
Good	51-75	1.25 to 1.5	0.75 to 0.67
Fair	26-50	1.5 to 2.0	0.67 to 0.50
Poor	0-25	2.0 to 4.0	0.5 to 0.25

9. Field Office

Provo	Cedar City	Morgan	Salt Lake City
Beaver	Layton	Tremonton	Richfield
Logan	Nephi	Ogden	Heber City

Relative Quality of Plants for Sheep and Deer

Preferred	Desirable	Undesirable
Grasses	**Grasses**	**Forbs**
big bluegrass	bluebunch wheatgrass	daisy
muttongrass	basin wildrye	lupine
Sandberg bluegrass	bearded wheatgrass	yarrow
Idaho fescue	slender wheatgrass	astragalus
	squirreltail	bedstraw
Forbs	Columbia needlegrass	goldenrod
	indian ricegrass	indian paintbrush
arrowleaf balsamroot	Kings fescue	mulesear dock
geranium	Kentucky bluegrass	penstemon
peavine	Letterman needlegrass	stoneseed
tapertip hawksbeard	mountain brome	timber poisonvetch
	oniongrass	
Woody	nodding brome	**Woody**
	prairie junegrass	
antelope bitterbrush	trisetum	Gambel oak
birchleaf mountainmahogany		bigtooth maple
serviceberry	**Forbs**	chokecherry
Woods rose		littleleaf horsebrush
rose	horsemint	
	aster	
	eriogonum	
	groundsel	
	showy elkweed	
	Woody	
	big sagebrush	
	mountain snowberry	
	Utah snowberry	
	yellowbrush	
	eriogonum	
	threetip sagebrush	

Relative Quality of Plants for Cattle and Elk

Preferred	Desirable	Undesirable
Grasses	**Grasses**	**Forbs**
bluebunch wheatgrass	basin wildrye	daisy
bearded wheatgrass	Sandberg bluegrass	horsemint
slender wheatgrass	squirreltail	lupine
big bluegrass	indian ricegrass	yarrow
muttongrass	Kings fescue	aster
Columbia needlegrass	Kentucky bluegrass	astragalus
Idaho fescue	Letterman needlegrass	bedstraw
mountain brome		eriogonum
oniongrass	**Forbs**	goldenrod
nodding brome		groundsel
prairie junegrass	arrowleaf balsamroot	indian paintbrush
trisetum	geranium	mulesear dock
	peavine	penstemon
Forbs		showy elkweed
	Woody	stoneseed
tapertip hawksbeard		timber poisonvetch
	birchleaf mountainmahogany	
Woody	serviceberry	**Woody**
	Woods rose	
antelope bitterbrush	rose	big sagebrush
		Gambel oak
		mountain snowberry
		Utah snowberry
		yellowbrush
		bigtooth maple
		chokecherry
		eriogonum
		littleleaf horsebrush
		threetip sagebrush

USDA, SCS
Section II-E
Technical Guide
Area _____, Texas

STEEP ROCKY
RANGE SITE DESCRIPTION
PE 31-44

Land Resource Area EP

Location _____

Date _____

Approved by _____

1. PHYSIOGRAPHIC FEATURES: This site consists of steep, rough breaks and hillsides; slopes range from 12 to 30 percent. It is along larger streams and rivers. Elevation ranges from 600 to 1,600 feet.

2. SOILS:

   a. These dark clays are shallow to very shallow. Stones and boulders cover 35 to 65 percent of the soil surface. The soils are fertile, usually have good structure, and take in water readily. Their fertility and moisture-holding capacity, however, is limited by soil depth. Fissures in the limestone bedrock, on the other hand, generally contain fine soil particles and store some moisture. Plant roots penetrate these cracks and crevices, and thus have access to more moisture and plant nutrients than is apparent in the soil. Forage produced on the site is of good quality.

   b. Major soils associated with the site are:

      Tarrant stony clay, 12 to 30 percent slopes
      Tarrant-rock outcrop

   c. Specific site location:

3. CLIMATE:

   See field office climate description.

4. CLIMAX VEGETATION:

a. This is a savannah site of about 30 percent tree canopy. Texas oak, Bigelow oak and live oak are the dominant overstory, but hackberry, elm, sumac, and many other species occur. Little bluestem and sideoats grama dominate the herbaceous plant community, making up almost 50 percent of the total annual production of the site. Sideoats grama is the subdominant. Green sprangletop, tall dropseed, tall grama, big bluestem, indiangrass, feathery bluestems, and slim and rough tridens are also endemic to the site but occur less frequently or in smaller amounts. Several palatable forbs and browse plants add color to the site and variety to the diet of grazing animals.

Relative Percentage of Total Plant Community (air-dry weight)

Grasses	75%	Woody plants	15%	Forbs	10%
little bluestem	35	live oak, Texas oak, Bigelow oak	10	Maximilian sunflower, bushsunflower, Engelman daisy, gayfeather, blacksamson, halfshrub sundrop, bundleflower, sensitivebriar, dalea, prairie-clover, scurfpea, western indigo, trailing ratany, knotweed, leaf-flower, western ragweed	10
sideoats grama	15				
indiangrass, big bluestem	5				
tall dropseed, cane, pinhole and silver bluestem	5				
green sprangletop, tall grama, slim and rough tridens, Wright and purple threeawn, Reverchon panicum, plains lovegrass, Texas cupgrass, Texas wintergrass, fall witchgrass, sedge	15	hackberry, ash, elm, Texas madrone, redbud, cherry, sumac species, kidneywood, bumelia, elbowbush, black dalea, agarito, Ashe juniper, Texas persimmon, Mexican-buckeye, greenbrier, Texas yucca, Texas sophora	5	mentzelia, plantain, filaree, other annual forbs	Trace

b. If retrogression is cattle induced, big and little bluestem, indiangrass, green sprangletop, sideoats grama, and the more palatable forbs are the primary decreasers. Feathery bluestem, tall dropseed, Texas wintergrass, tridens, and woody plants are the principal increasers.

If the plant community continues to degenerate, juniper, Texas persimmon, Mexican buckeye, sumac, and other species, which originally occupied the craggy limestone outcrop in trace amounts, may increase to form rather dense thickets. In the lower condition classes, woody plants will likely dominate the site. The understory in such conditions may consist of a sparse cover of cedar sedge, hairy tridens, threeawns, ovax, and queensdelight.

c. If this site is in excellent condition, the approximate total annual production ranges from 1,500 to 3,500 pounds of air-dry vegetation per acre, depending upon canopy, rainfall, and growing conditions. With a 30-percent tree canopy, as much as 600 pounds of the total annual production will be by woody plants. Part of this production will likely be unpalatable to or out of reach of grazing animals.

5. WILDLIFE ADAPTED TO THE SITE: This site is a preferred habitat for deer. Turkey and squirrel from adjacent bottom lands frequent the site and feed extensively on acorns and other mast. Many songbirds and small animals feed, nest, and raise their young on the site. Among these are the golden cheeked warbler and the cedar waxwing. The golden cheeked warbler is on the list of threatened and endangered species. It nests in mature juniper trees. Limited numbers of quail and dove occupy the site for brief periods, but the site is too steep and

rough to be preferred by these birds.

6. WOOD PRODUCTS: This site has no potential for lumber. The oak species have value for fire wood and charcoal production. Juniper that may increase on the site has value for fence posts and fence stays.

7. ESTHETIC AND RELATED VALUES: Colorful forbs dot the landscape throughout spring, summer, and early fall, when moisture is adequate. Brilliant red, orange, and yellow hues of Texas oak, flameleaf sumac, and escarpment black cherry interspersed among evergreen sumac, live oak, and juniper trees make this a colorful site each autumn. Texas madrone, an endangered small tree, is on the site in limited numbers. This is one of few sites to which this beautiful species is native. Texas wildrice, an extremely rare grass, grows in running waters of stream emanating from the site. In climax condition, this site is an excellent source of plants valuable for landscaping.

8. HYDROLOGIC CHARACTERISTICS: Because of the rough, steep topography, in combination with very slowly permeable soils and limestone outcrop, runoff is rapid on the site. However, soil structure, plant cover, and rock outcrop, greatly reduce erosion potential, thus causing the site to yield runoff which is relatively free of sediment. Localized fractures, crevices, and caverns in the limestone increase infiltration rates and provide a source of groundwater recharge. Numerous seeps and springs occur at the base of the site, providing a continuing flow of high-quality water for downstream use.

9. GUIDE TO INITIAL STOCKING RATE:

a.

Condition class	Percent climax vegetation	Acres/AU/yearlong
Excellent	76-100	14-17
Good	51-75	17-20
Fair	26-50	20-25
Poor	0-25	25+

b. Introduced species

	Percent ground cover	Acres/AU/yearlong
King Ranch bluestem		
	100-76	14-18
	75-51	18-22
	50-26	22-28
	25-0	28+

RELATIVE FORAGE QUALITY OF SPECIES 1/

a. For Cattle:

Primary 2/	Secondary 3/	Low value 4/
big bluestem	tall dropseed	cedar sedge
indiangrass	tall grama	hairy tridens
little bluestem	cane, pinhole and silver bluestem	Texas grama
green sprangletop	Texas wintergrass	tumblegrass
sideoats grama	slim and rough tridens	western ragweed
Texas cupgrass	Reverchon panicum	croton
Maximilian sunflower	Wright and purple threeawn	prairie coneflower
bushsunflower	scurf-pea	evax
Englemanndaisy	western indigo	live oak
gayfeather	trailing ratany	Texas oak
blacksamson	hackberry	Bigelow oak
halfshrub sundrop	greenbrier	sumac species
bundleflower	black dalea	elm
sensitivebriar		bumelia
daleas		elbowbush
prairie-clover		agarito
kidneywood		juniper
		Texas persimmon
		Mexican-buckeye
		queensdelight
		Texas yucca
		Texas sophora

b. For Sheep:

Primary	Secondary	Low value
big bluestem	tall dropseed	hairy tridens
little bluestem	tall grama	Texas grama
indiangrass	cane, pinhole and silver bluestem	red grama
green sprangletop	Texas wintergrass	tumblegrass
sideoats grama	plains lovegrass	windmillgrass
Texas cupgrass	Wright and purple threeawn	red threeawn
Scribner panicum	scurf-pea	cedar sedge
fall witchgrass	western indigo	western ragweed
Maximilian sunflower	trailing ratany	prairie coneflower
bushsunflower	sida and nettle	twoleaf senna
blacksamson	broomweed	hoarhound
gayfeather	bumelia	silverleaf nightshade
Mexican sagewort	catclaw mimosa	agarito
Englemanndaisy	Bigelow oak	elbowbush
penstemons	Texas oak	juniper
halfshrub sundrop	sumac species	Texas persimmon
bundleflower	greenbrier	pricklypear
sensitivebriar	hackberry	queensdelight
daleas	Texas madrone	Texas sophora
prairie-clover	black dalea	Mexican-buckeye
knotweed leaf-flower	silktassel	Texas yucca
oxalis		elm
plantain		
filaree		
acorns		
kidneywood		
live oak		

c. For Goats:

Primary	Secondary	Low value
live oak	elbowbush	agarito
Texas oak	littleleaf sumac	juniper
Bigelow oak	evergreen sumac	Texas persimmon
kidneywood	flameleaf sumac	Texas sophora
Texas madrone	scurf-pea	Texas yucca
black dalea	western indigo	Mexican-buckeye
catclaw mimosa	trailing ratany	queensdelight
Lindheimer silk-tassel	plantain	pricklypear
bumelia	sida and nettle	western ragweed
greenbrier	big bluestem	broomweed
Maximilian sunflower	indiangrass	prarie coneflower
bushsunflower	little bluestem	twoleaf senna
blacksamson	feathery bluestems	hoarhound
gayfeather	fall witchgrass	silverleaf nightshade
Mexican sagewort	tall dropseed	red threeawn
Englemanndaisy	Wright and purple threeawn	hairy tridens
penstemons	plains lovegrass	Texas grama
halfshrub sundrop	sideoats grama	red grama
bundleflower	Texas cupgrass	tumblegrass
sensitivebriar	scribner panicum	windmillgrass
daleas	Reverchon panicum	cedar sedge
prairie-clover	Texas wintergrass	
knotweed leaf-flower	acorns	
mat euphorbia		
oxalis		
filaree		

d. For Quail and Dove: 5/

Primary	Secondary	Low value
western ragweed	scurf-pea	fuzzy seeded grasses and forbs
croton	western indigo	nonmast-producing woody plants
sunflowers	broomweed	coneflowers
snow-on-the-mountain	lovegrass seed	hoarhound
bundleflower	dropseeds	twoleaf senna
sensitivebriar		eyax
partridgepea		silverleaf nightshade
daleas		trailing ratany
prairie-clover		bluestems
panicum seed		threeawns
acorns		gramas
other mast and fruits		

e. For Deer:

Primary	Secondary	Low value
live oak	littleleaf sumac	agarito
Texas oak	evergreen sumac	juniper
Bigelow oak	flameleaf sumac	Texas persimmon
elm	bumelia	Texas sophora
kidneywood	elbowbush	Texas yucca
Texas madrone	scurf-pea	Mexican-buckeye
Lindheimer silk-tassel	western indigo	queensdelight
black dalea	trailing ratany	western ragweed
catclaw mimosa	gaura	broomweed
greenbrier	gayfeather	prairie coneflower
acorns	mat euphorbia	twoleaf senna
Maximilian sunflower	sida and nettle	hoarhound
bushsunflower	oxalis	silverleaf nightshade
knotweed leaf-flower	Texas wintergrass	snow-on-the-mountain
blacksamson	fall witchgrass	bluestems
plantain		threeawns
Mexican sagewort		gramas
Englemanndaisy		dropseeds
penstemons		tridens
halfshrub sundrop		cedar sedge
bundleflower		
sensitivebriar		
daleas		
prairie-clover		
rescuegrass		
Scribner panicum		

f. For Turkeys: 5/

Primary	Secondary	Low value
acorns	large seeded grasses and forbs	queensdelight
other mast and fruits		Mexican-buckeye
panicum seed		evax
		hoarhound
		twoleaf senna
		Texas yucca
		Texas sophora
		bluestems
		threeawns
		gramas

g. For Squirrels: 5/

Primary	Secondary	Low value
acorns	large seeded grasses and forbs	queensdelight
bumelia fruit	buds and twigs	buckeye
persimmons		hoarhound
other mast and fruits		other forbs
		other grasses

EXPLANATION OF FOOTNOTES USED
ON RANGE SITE DESCRIPTIONS

1/ This rating system provides general guidance as to animal preference for plant species. It also indicates competition between kinds of animals for the various plants. Grazing preference changes from time to time and place to place depending upon the animal, plant palatability and nutritive value, stage of growth and season of use, relative abundance, and associated plants. Grazing preference does not necessarily reflect the place of a plant in the range ecosystem.

2/ These species generally decrease under prolonged heavy grazing.

3/ These plants usually increase initially, then decrease under prolonged heavy use.

4/ These plants continue to increase with heavy grazing use.

5/ For these wildlife species the terms primary, secondary and low value indicate animal preference only. They do not indicate plant response to feeding pressure; nor do they have any ecological significance.

CLIMAX PLANT COMMUNITY DATA SHEET

LOAMY BREAKS RANGE SITE
(Southern Rocky Mountains LRA)

Species	Potential plant community			Response to grazing[2]		
	Normal variation		Productivity			
	Production	Composition	rating[1]	Cattle	Sheep	Deer
	lb/acre	Percent				
bluebunch wheatgrass	150-320	15-25	3	D	I-D	I
western wheatgrass	50-135	5-10	4	I-D	I	I
needleandthread	50-100	5-10	4	D	I-D	I
Sandberg bluegrass	5-40	T-5	5	I	I-D	I
Nevada bluegrass	5-40	T-5	5	D	D	I-D
indian ricegrass	5-40	T-5	5	D	I-D	I
muttongrass	5-40	T-5	5	D	D	I-D
prairie junegrass	5-40	T-5	5	D	I-D	I
bottlebrush squirreltail	5-40	T-5	5	I-D	I	I
arrowleaf balsamroot	35-100	5-10	4	I	D	I
milkvetch	5-40	T-5	5	I	D	I
herbaceous buckwheat	5-40	T-5	5	I	I-D	I-D
lupine	5-40	T-5	5	I	I-D	I
stemless goldenweed	5-40	T-5	5	I	I	I
mountainmahogany	10-100	1-10	4	I-D	I-D	D
antelope bitterbrush	10-120	1-10	4	I	I-D	D
black sagebrush	30-100	2-10	4	I-D	D	D
big sagebrush	5-90	T-10	4	I	I-D	I-D
low rabbitbrush	5-40	T-5	5	I	I	I
serviceberry	5-40	T-5	5	I	I	I-D
Normal Total Production	950-1200	----	-	-	---	---
Common Invaders						
cheatgrass brome	0	0	INV	I	I	I
annual mustards	0	0	INV	I	I	I
Russian thistle	0	0	INV	I	I	I
rubber rabbitbrush	0	0	INV	I	I	I-D

1/Productivity ratings (relative rating of production and occurrence for the potential community):
1--Always present, more than 50 percent of total annual production.
2--Always present, makes up 25-50 percent of total annual production.
3--Generally present, makes up 10-24 percent of total annual production.
4--Frequently present, makes up less than 10 percent of total annual production.
5--Occasionally present, makes up less than 5 percent of total annual production.

2/Response to grazing:
D--Decreases under continued moderately heavy grazing use.
I--Increases under continued moderately heavy grazing use.
I-D--Initially increases, but then decreases as species more sensitive to grazing decline.

Note: To determine range condition: For the existing plant cover, count as climax not more than the maximum amount shown above for any species in the potential plant community.

Exhibit 305.5

RANGE CONDITION WORKSHEET

LOCATION Heppner SWCD RANGE SITE Rolling Hills

PASTURE Spring Creek L.R.A. B-8

OPERATING UNIT Shirley Rugg DATE 6/15/74 BY Anderson-Rugg

Species	Approximate potential production	Present production	
		Estimated amount	Allowable1/
	Pound per acre	-------Pound per acre--------	
bluebunch wheatgrass	2000	700	700
Idaho fescue	500	100	100
Sandberg bluegrass	80	150	80
cheatgrass	---	100	---
six-weeks fescue	---	40	---
squirreltail	---	70	---
silky lupine	100	250	100
arrowleaf balsamroot	100	100	100
pussytoes	40	100	40
hangingpod milkvetch	50	20	20
lineleaf fleabane	30	180	30
tumble mustard	---	40	---
tarweed	50	50	50
yarrow	50	50	50
big sagebrush	T	1500	---
snakeweed	---	100	---
Total	3000	3550	1270
Range condition			42%
Range condition class			Fair

1/ Can be equal to, but not in excess of the approximate potential production

NRH-1, July 13, 1976

USDA-SCS
Date _____
Approved by _____

_____ Field Office
Technical Guide
Sec. IIF - Woodland

WOODLAND SUITABILITY GROUP

A. Symbol: 107 MLRA: LH 134

B. Soils: The soils have very high potential productivity. They have no serious management problems and are suitable for southern hardwoods or pines.

Soils: Collins sil; Vicksburg sil; all have slopes of less than 2 percent.

C. Nature of plant community (overstory) and kinds of wildlife benefitted:

Trees to favor				Trees to plant
Kinds (species)	Tallest (dominant) trees		Kinds of wildlife benefitted 1/	
	Avg. height	Age		
green ash	90	50	S,Q,B	green ash
cottonwood	110	30	D	cottonwood 2/
cherrybark oak	100	50	S,D,T,Q	cherrybark oak
nuttall oak	100	50	S,D,T,Q	nuttall oak
water oak	100	50	S,D,T,Q,B,W	sumard oak
loblolly pine	90	50	S,Q,B,T	cow oak
shortleaf pine	80	50	S,Q,B,T	water oak
sweetgum	100	50	S,Q,B	sweetgum
black walnut	---	--	S,B	sycamore 2/
yellow-poplar	---	--	D	yellow-poplar
				loblolly pine

1/ S = squirrel; D = deer; T = turkey; Q = quail; B = birds; W = ducks.

2/ Field plantings only, do not interplant or underplant.

NATURE OF PLANT COMMUNITY (Understory) AND FORAGE VALUE FOR GRAZING ANIMALS
[Understory production, by canopy classes]

Species	Canopy class			Grazing value 1/ for	
	Sparse 1-35%	Medium 36-55%	Dense 56-70%		
	Lb/acre	Lb/acre	Lb/acre	Cattle	Deer
switchgrass	1,500	300	---	P	U
indiangrass	800	100	---	P	U
switchcane	1,000	500	100	P	D
eastern gamagrass	500	200	---	P	U
Virginia wildrye	300	300	50	P	D
uniolas	100	500	500	P	U
beaked panicum	200	300	200	P	U
low panicums	100	100	100	D	D
other grasses	400	200	100	---	---
native lespedezas	100	50	50	D	P
asters	50	50	---	U	D
swamp sunflower	50	50	---	U	D
goldenrods	50	---	---	U	U
other forbs	300	200	100	---	---
greenbrier	200	300	50	U	P
peppervine	---	50	50	U	D
red-berried moonseed	50	50	50	U	D
wild grape	50	100	100	U	P
other shrubs and vines	---	---	---	---	---

1/ Grazing value of plant species: P = preferred species; D = desirable forage species; U = undesirable species.

GUIDE TO INITIAL STOCKING RATE FOR CATTLE

Forage value rating 1/	Canopy class		
	Sparse	Medium	Dense
	Acre/AUM	Acre/AUM	Acre/AUM
Very high	0.6	1.0	2.2+
High	1.1	1.8	3.0+
Moderate	1.7	4.0	8.0
Low	3.5+	8.0+	10.0+

1/ Forage Value Rating:

Very high = 50% or more of understory production is from preferred species.
High = 30-50% of understory production is from preferred species.
Moderate = 10-30% of understory production is from preferred species.
Low = less than 10 percent of understory production is from preferred species.

AREA _____

FIELD OFFICE _____

DATE _____
APPROVED BY _____

GRAZING GUIDE FOR GRAZABLE WOODLAND AND NATIVE PASTURE

Grazing Group--Loamy Bottomland

Woodland Suitability Group(s)--lw5 (Part), lw8, 107, 204 (Part)

A. Nature of plant community:

In this group are all the sandy and silty loam soils on creek bottoms and river bottoms of east Texas. Lobolly pine, shortleaf pine, cypress, American sycamore, water oak, willow oak, American linden, cottonwood sweetgum, black willow, southern sweetbay, pecan and bitter pecan, beech, red maple, hackberry, river birch, and green ash are the most common species on these soils. Stands may be pure or mixed. Southern red oak, swamp chestnut oak, mulberry, and overcup oak are also common on these soils. Understory vegetation is usually moderate, consisting of elm, locust, hawthorn, blue beech, rattan, and greenbrier. This grazing group is more productive for pines but less productive for hardwood and herbaceous vegetation than the broad Clayey Bottomland Group, but the soils are not as subject to overflow. They are often very narrow and thus are difficult to manage efficiently. Vegetation composition on the two sites is similar with few exceptions. Timber production is more stable on this site because of better year-round accessibility. Herbaceous vegetation generally consists of Florida paspalum, Virginia wildrye, switchgrass, switchcane, beaked panicum, plumegrass, sedges, longleaf uniola, redtop panicum, lespedeza, and tickclover.

B. Wildlife species:

Major wildlife species inhabitating this plant community are fox squirrels, white-tailed deer, swamp rabbit, bobwhite quail, mourning dove, and furbearers.

C. Soils:

1. The soils in this group are generally well drained to moderately well drained. They are not subject to frequent or prolonged overflow. The soils can be logged except during excessively wet seasons.

2. Significant soils associated with this grazing group are:

Iuka fine sandy loam
Athens fine sandy loam
Bruno very fine sandy loam
Bruno loamy fine sand
Crevasse fine sand
Ocklackonee fine sandy loam
Wahadkee soils
Oktibbeha fine sandy loam

D. Relative value of species for cattle:

Preferred	Desirable	Undesirable
Virginia wildrye	low panicums	vaseygrass
Canada wildrye	low paspalums	palmetto
plumegrass	blackseed stipa	sumpweeds
sedges	redtop panicum	broomsedge bluestem
beaked panicum	two-flower melic	bloodroot ragweed
indiangrass	nimblewillgrass	annual grasses and weeds
switchgrass	white tridens	berry vines
eastern gamagrass	longspike tridens	cow-itch vine
longleaf uniola	perennial legumes	poison oak
big bluestem		

Loamy Bottomland

E. Relative value of plant species for wildlife:

1. Deer food plants

Preferred	Desirable	Undesirable
rattan	water oak	sweetgum
greenbrier	willow oak	beech
honeylocust	elm	pine
ash	hawthorn	cypress
mast	willow	cottonwood
sedges	mulberry	birch
Canada wildrye	hackberry	
Virginia wildrye	sweetbay	

2. Quail and dove food plants

Preferred	Desirable	Undesirable
ragweed	bushclover	crabgrass
croton	tickclover	lovegrass
sunflower	narrowleaf sumpweed	wildcelery
partridgepea	wildbean	sida
wild geranium	milkpea	dock
panicum grass	bristlegrass	goldstar
paspalum grass	barnyardgrass	flowering spurge
sharpbract sumpweed	sedges	flatsedge

3. Squirrel food plants

Important food plants for squirrel on this sandy bottom land site are mast of such trees as oaks, magnolia, pecan, pine, and sweetgum; fleshy fruits of hackberry, red mulberry, and grape; buds and twigs of such trees and shrubs as hawthorns, oak, elm, sweetgum, beech, and river birch; and the larger seeds of grasses and forbs.

GUIDE FOR DETERMINING FORAGE COMPOSITION AND VALUE ON NATIVE PASTURELANDS AND GRAZABLE WOODLANDS

GRAZING GROUP Loamy Bottomland FIELD OFFICE _____

WOODLAND SUITABILITY GROUPS: 1w5 (part), 1w8, 107, 204 (Part)

PLANTS AND SHADE TOLERANCE[5]	PRODUCTIVITY RATING of SPECIES BY CANOPY CLASS[4] 0-20%	21-35%	36-55%	56-70%	SPECIES OF PLANTS
Preferred[1]	Open	Sparse	Medium	Dense	Undesirable[3]
Introduced perennials[6]	---	---	---	---	vaseygrass
Virginia wildrye (S)	5	5	4	3	palmetto
sedges (S)	4	4	3	2	sumpweeds
plumegrass (N)	5	5	5	---	winged elm
beaked panicum (M)	2	2	3	5	broomsedge bluestem
indiangrass (N)	3	3	4	---	bushy bluestem
switchgrass (N)	5	5	---	---	bloodroot ragweed
eastern gamagrass (N)	2	3	5	---	berryvines
longleaf uniola (S)	---	5	4	3	annual weeds and grasses
switchcane (M)	2	2	3	4	
purpletop (M)	5	5	5	---	
Desirable[2]	Percent	Percent	Percent	Percent	
low panicums (M)	5	5	10	10	
low paspalums (M)	5	5	5	-	
blackseed stipa (M)	5	5	10	10	
redtop panicum (M)	10	10	10	5	
white tridens (N)	5	5	T	T	
longspike tridens (N)	5	5	T	T	
two-flower melic (S)	-	-	5	10	
nimblewillgrass (S)	-	-	5	10	
carpetgrass (M)	5	5	5	10	
perennial forbs[7] (M)	---	---	---	---	

Guide to initial stocking rates for cattle:

Forage value rating	Minimum percent of preferred species	Total production of forage species (open to dense canopy)	Canopy class (Acres/AU-yearlong) 0-20% Open	21-35% Sparse	36-55% Medium	56-70% Dense
Very high	50+	8,000 - 3,000	6-9	9-13	13-16	20-25
High	30-49	5,000 - 2,000	9-13	13-16	16-25	25-30
Moderate	10-29	4,000 - 1,000	13-16	16-20	20-30	30-35
Low	10	2,000 - 500	16+	20+	30+	35+

1/ These species generally declined under continued heavy grazing.
2/ These species are likely to become more abundant if preferred species are destroyed.
3/ Some of these species are likely to become very abundant if better plants are removed or decline in vigor.

4/ Productivity rating index:

1--Always present, makes up more than 50 percent of total understory production.
2--Always present, makes up 25 to 49 percent of total understory production.
3--Usually present, may contribute as much as 25 percent of production.
4--Frequently present but never exceeds 10 percent of production.
5--Occasionally present, never exceeds 5 percent of production.

5/ Shade tolerance:
S = shade tolerant; M = medium shade tolerance; N = intolerance of shade.

6/ High-quality adapted introduced plants.

7/ Perennial forbs include lespedesas, tickclover, Illinois bundleflower, trailing wildbeans, an asters.

Exhibit 402.2C

GRAZING GUIDE FOR WOODLAND

Soil Conservation Service
Area I and II Idaho
and
Idaho Department of Public Lands
Areas 5 through 8

MLRA E-43

Approved By: DF & DF

Woodland Community Type--Ponderosa Pine - Grass
Woodland Suitability Group -- 4r1 4x1
Soil series--Syringia-like, Quartzburg, Toiyabe

These soils are grayish brown and dark grayish brown moderately coarse textured and coarse textured. They formed in residuum weathered from granite. They are well drained to excessively drained and have moderate to rapid permeability. Precipitation ranges from 19 to 32 inches but is generally 25 to 32 inches.

A. Nature of the woodland community:

This is a ponderosa pine site on soils of granitic or similar origin. Slopes range from 5 to 50 percent, and the general aspect is south and west. Greatest forage production usually occurs under even-aged mature or nearly mature stands of trees.

The understory vegetation consists of perennial grasses, approximately 80 percent, and perennial forbs, approximately 20 percent. Shrub species are sparse.

B. Relative grazing value for the understory for:

1. Cattle and elk

Preferred	Desirable	Undesirable
Grasses and grasslike	Grasses	Forbs
bluebunch wheatgrass	pinegrass	goatweed
bluewildrye		Montana pea
Columbia needlegrass		stickseed
elk sedge	Forbs	thistle
Idaho fescue	arrowleaf balsamroot	yarrow
prairie junegrass	lupine	
Forbs		
leervetch		
hawksbeard		

2. Sheep and deer

refered	Desirable	Undesirable
rasses and grasslike	Grasses	Forbs
daho fescue	bluebunch wheatgrass	goatweed
lk sedge	blue wildrye	Montana pea
rairie junegrass	Columbia needlegrass	stickseed
	pinegrass	thistle
		yarrow
orbs	Forbs	
rrowleaf balsamroot	lupine	
awksbeard		
ervetch		

C. Determination of forage value rating:

Forage value rating	Minimum percentage of preferred and desirable species, by weight
Very high	50 preferred + desirable = 90
High	30-49 preferred + desirable = 60
Moderate	10-29 preferred + desirable = 30
Low	Less than 10 preferred

D. Suggested initial stocking rates:

Forage value rating	Canopy class		
	Sparse 1/ (0-10%)	Medium (10-40%)	Dense (40-70%)
		Acre/AUM	
Very high 2/	1.0-1.6	1.6-3.0	3.0-6.5
High	1.6-3.0	3.0-6.5	6.5-11.0
Medium	3.0-6.5	6.5-11.0	11.0-20.0
Low	6.5-11.0	11.0-16.0	20.0+
Seeded 3/	.6-1.3	---	---

1/ Sparse includes cutover land and poorly stocked stands.

2/ Conservationists must use considerable judgment because in places, an area in the very high forage value class could be producing less than normal volumes, and adjustments would need to be made in the initial stocking rate.

3/ See field office Technical Guide for seeding recommendations.

E. Wildlife values:

This site provides winter and spring habitat for many mule deer and a few elk. If the vegetation cover is adequate, blue grouse use this area for nesting and then migrate to higher elevations during winter. If grasses and forbs are adequate, Merriam turkey use this site for forage; they never stray far from the timber and shrub areas. Chukars also inhabit this community type in some areas of the state.

F. Effect on total environment:

Proper treatment of this resource results in reduction of soil losses and stream pollution by sediment to an acceptable minimum. This site provides optimum habitat for wildlife, especially big game. It is one of the prime big game hunting areas in the state. Other recreation opportunities include riding, hiking, and camping. The soils are unstable, and the erosion hazard is high if the vegetation cover is destroyed.

G. Watershed values (hydrologic interpretations):

GRASSLAND SUITABILITY GROUP 4-A

In this group are deep and moderately deep, well-drained, soils on uplands. Slopes are more than 45 percent. Surface texture ranges from fine sandy loam and loam to clay loam. The subsoil is mostly loam and clay loam. Cherty phases are included in this group. The soils have moderate to high available water capacity. They have desirable physical characteristics and are suitable for year-round grazing use. Elevation changes enough at some locations to influence plant growth. The growing season is shorter at higher elevations. Exposure also influences plant growth. The soils on north- and east-facing slopes have more available moisture and are the most productive.

Major Soils Associated With This Group.

Bland si,cl
Bolton l, cl
Chester l, cl, sil
Clifton l, cl
Coeburn sil
Cumberland l
Decatur sil, sicl
Edneyville fsl, l
Edom sil, sicl
Elioak l, sil, vfsl, cl
Elliber sil
Etowah sil
Frankstown sil
Frederick sil, sicl
Gilpin sil
Glenelg sil, sicl
Hagerstown sil,sicl
Hayesville fsl, l, cl
Hayter fsl, l
Hiwassee fsl, l, sicl, cl
Jefferson fsl, l, sicl
Leetonia fsl
Murrill fsl, l
Myersville l, sil
Pisgah sil
Rabun l, sil
Talbott sil
Tellico fsl
Thurmont fsl, l, sil, cl
Wellston fsl, l

Approved by D.D.W.
(4/75)

GRASSLAND SUITABILITY GROUP 4-A

Use and Management

These are productive upland soils suitable for year-round use. The topography is so steep that the use of conventional farm equipment is prohibited. Even though these soils are productive, it is questionable whether practicing aerial fertilization similar to that used on accessible areas is feasible. These soils are extensive, and the native grasses growing on these soils can be used to an advantage in planned grazing systems. Management should be aimed at keeping a good cover on the land to prevent soil erosion and water loss.

The present cover varies from native grasses to mixtures of naturalized orchardgrass, timothy, tall oatgrass, and meadow fescue (above 2,500 feet). Little bluestem is the native grass covering large acreages. Other prominent natives are purpletop tridens, indiangrass, broomsedge bluestem, and lesser amounts of low panicums and paspalums. The most productive grasses occur on soils having the best natural fertility and the most favorable environmental factors (exposure, elevation, etc.).

The present or natural cover should be a guide to use and management. The native grasses have greater value for grazing from June through September. If fenced separately from other kinds of pasture, these grasses can provide needed grazing and make the best contribution to a grazing system during this period. Fertilized grasses can be rested during this period. An occasional rest from grazing during the growing season and rotation of grazing with other pastures will keep these plants productive. Brush management and grazing according to accepted standards of proper use are also necessary.

Best Adapted Grasses

Little bluestem, indiangrass, switchgrass, big bluestem, naturalized orchardgrass, timothy, meadow fescue (above 2,500 feet), and tall oatgrass.

Exhibit 503

FIELD OFFICE _____

DATE _____

MLRA _____

Approved by _____

NATIVE PASTURE GROUP

1. Name or number: Clayey Bottomland

2. Soils:

   A. In this group are deep clay loams and clays. The soils are in frequently flooded areas adjacent to major streams. They hold large amounts of water readily available to plants and are naturally fertile.

   B. Major soils included in this pasture group are:

Lela clay	Roebuck clay loam
Pledger clay	Earle clay
Portland clay	Tuscumbia clay

3. Nature of the Plant Community:

   A. The overstory tree stand is made up of a mixture of hardwoods, including water oak, willow oak, cottonwood, black willow, pecan, red ash, elm, and hackberry. Most stands were heavily cut over in the past, and usually most of the merchantable trees have been removed. Woody understory vegetation includes hawthorn, greenbrier, cow-itch vine, blue beech, rattan, and eastern hornbeam. On many areas these woody plants, along with excessive amounts of tree reproduction, form dense thickets that greatly reduce forage production.

   B. Major forage plants include a variety of sedges, beaked panicum, red panicum, Virginia wildrye, switchcane, brown plumegrass, low panicums, and low paspalums. Sedges, wildrye, and rustyseed paspalum are most abundant under dense canopy. If most of or all the trees are removed, buffalograss frequently becomes abundant.

   C. Relative value of plant species for cattle:

Preferred	Desirable	Undesirable
sedges	redtop panicum	broomsedge bluestem
Virginia wildrye	nimblewillgrass	bushy bluestem
beaked panicum	twoflowermelic	buffalograss
purpletop	vine-mesquite	sumpweeds
longleaf uniola	low panicums	bloodroot ragweed
switchcane	low paspalums	devilsclaw aster
eastern gamagrass		annual grasses and legumes

[illegible] Cutoland

Relative value of plant species for wildlife:

1. Deer food plants

Preferred	Desirable	Undesirable
[illegible]ersweet	buttonbush	American elder
[illegible]p cyrilla	buckwheat-tree	waxmyrtle
Virginia sweetspire	possum-haw	
redbay	baygall holly	
rattan	sweetbay	
greenbrier		
sedges		
Canada wildrye		
rescuegrass		

2. Duck food plants

Preferred duck food plants on this kind of native pasture are smartweed, barnyardgrass, Japanese millet, acorns, and aquatic plants.

3. Squirrel food plants

Preferred squirrel food plants are mast from such trees as pecan, oak, water tupelo, and magnolia; grapes, red mulberry, hackberry, blackhaw, and other fleshy fruits; twigs and buds of oak, hackberry, elm, and sweetgum. The squirrels also eat the larger seeds of forbs and grasses.

GUIDE FOR DETERMINING FORAGE COMPOSITION AND VALUE ON NATIVE PASTURE

GRAZING GROUP Clayey Bottomland FIELD OFFICE _____

DATE _____

Species of plants and shade tolerance 1/	Productivity rating of species by canopy class 2/ 0-20%	21-35%	36-55%	56-70%	Species of plants
Preferred 3/	Open	Sparse	Medium	Dense	Undesirable 4/
introduced perennials 5/					devilsclaw aster
					bloodroot ragweed
sedges (S)	3	3	2	1	sumpweed
Virginia wildrye (S)	3	3	3	2	bushy bluestem
beaked panicum (M)	3	3	4	5	broomsedge bluestem
purpletop (M)	5	5	5	-	eastern bitterweed
longleaf uniola (S)	-	-	5	4	snow-on-the-prairie
eastern gamagrass (N)	5	5	5	-	broomweed
longtom (N)	4	4	5	-	berry vines
rustyseed paspalum (M)	3	3	2	2	annual weeds and grasses
brown and silver plumegrass (M)	3	3	4	5	winged elm
Desirable 6/	---------- Percent ----------				
redtop panicum (M)	10	10	5	5	
nimblewillgrass (S)	-	-	10	10	
twoflower melic (S)	-	Trace	5	10	
Carolina jointtail (M)	5	5	5	Trace	
low panicums (M)	5	5	5	-	
low paspalums (M)	5	5	5	-	
buffalograss (N)	10	10	-	-	
perennial forbs 7/ (M)	5	5	5	5	

Guide to initial stocking rate for cattle:

Forage value rating	Minimum percent of preferred species	Total production of forage species ----- Open to dense canopy	Canopy class (Acres/AU-yearlong) 0-20% Open	21-35% Sparse	36-55% Medium	56-70% Dense
Very high	50+	10,000-3,000	5-7	7-10	10-12	10-12
High	20-50	8,000-2,000	7-10	10-12	12-16	12-16
Moderate	10-30	4,000-1,000	12-16	12-16	16-30	16-30
Low	0-10	2,000-1,000	12+	16+	20+	20+

1/ Shade tolerance
S = Shade tolerant M = Medium shade tolerant N = Nonshade tolerant

2/ Productivity rating index
1-Always present, makes up more than 50 percent of total understory production.
2-Always present, makes up 25 to 49 percent of total understory production.
3-Usually present, may contribute as much as 25 percent of production.
4-Frequently present, but never exceeds 10 percent of production.
5-Occasionally present, never exceeds 5 percent of production.

3/ These species generally decline with continued heavy grazing.

4/ Some of these species are likely to become very abundant if better plants are removed or decline in vigor.

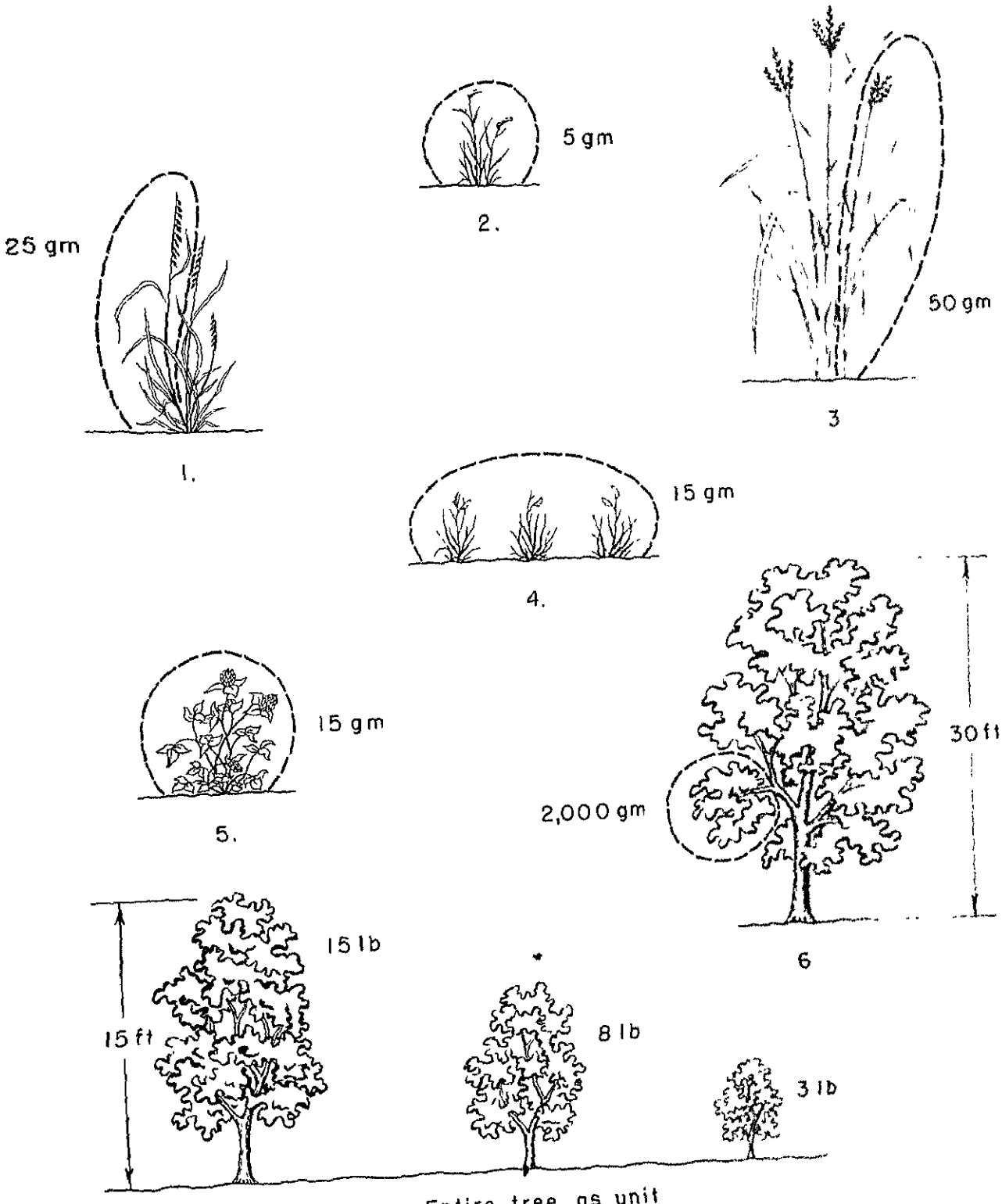
5/ High-quality adapted introduced plants.

6/ These species are likely to become more abundant if preferred species are destroyed.

7/ Perennial forbs include lespedezas, tickclover, Illinois bundleflower, trailing wildbeans, and asters.

Exhibit 604.2(a)(2)

ILLUSTRATIONS OF DIFFERENT WEIGHT UNITS



Percentage of Air-Dry Matter in Harvested Plant Material at Various Stages of Growth

Grasses	Before heading; initial growth to boot stage	Headed out; boot stage to flowering	Seed ripe; leaf tips drying	Leaves dry; stems partly dry	Apparent dormancy
	Percent	Percent	Percent	Percent	Percent
Cool season.....	35	45	60	85	95
wheatgrasses					
perennial bromes					
bluegrasses					
prairie junegrass					
Warm-season					
Tall grasses.....	30	45	60	85	95
bluestems					
indiangrass					
switchgrass					
Mid grasses.....	40	55	65	90	95
side-oats grama					
tobosa					
galleta					
Short grasses.....	45	60	80	90	95
blue grama					
buffalograss					
short three-awns					

Trees	New leaf and twig growth until leaves are full size	Older and full-size green leaves	Green fruit	Dry fruit
	Percent	Percent	Percent	Percent
Evergreen coniferous.....	45	55	35	85
ponderosa pine, slash pine-longleaf pine				
Utah juniper				
rocky mountain juniper				
spruce				
Live oak.....	40	55	40	80
Deciduous.....	40	50	35	85
blackjack oak				
post oak				
hickory				

Percentage of Air-Dry Matter in Harvested Plant Material at Various Stages of Growth

Shrubs	New leaf and twig growth until leaves are full size	Older and full-size green leaves	Green fruit	Dry fruit
	Percent	Percent	Percent	Percent
Evergreen.....	55	65	35	85
big sagebrush				
bitterbrush				
ephedra				
algerita				
gallberry				
Deciduous.....	35	50	30	85
snowberry				
rabbitbrush				
snakeweed				
Gambel oak				
mesquite				
Yucca and yucca-like plants.....	55	65	35	85
yucca				
sotol				
saw-palmetto				

Forbs	Initial growth to flowering	Flowering to seed maturity	Seed ripe; leaf tips dry	Leaves dry; stems drying	Dry
	Percent	Percent	Percent	Percent	Percent
Succulent.....	15	35	60	90	100
violet					
waterleaf					
buttercup					
bluebells					
onion, lilies					
Leafy.....	20	40	60	90	100
lupine					
lespedeza					
compassplant					
balsamroot					
tickclover					
Fibrous leaves or mat.....	30	50	75	90	100
phlox					
mat eriogonum					
pussytoes					

Succulents	New growth pads and fruits	Older pads	Old growth in dry years
	Percent	Percent	Percent
pricklypear and barrel cactus.....	10	10	15+
cholla cactus.....	20	25	30+

ANNUAL FOLIAGE AND FRUIT PRODUCTION PER JUNIPER TREE ON DIFFERENT SITES
AND FOR DIFFERENT FOLIAGE CLASSES

Crown diameter	Site														
	Upland Loam			Upland Stony Loam			Upland Gravelly Loam			Upland Shallow Loam			Upland Shallow Hardpan		
	Foliage and fruit			Foliage and fruit			Foliage and fruit			Foliage and fruit			Foliage and fruit		
	Sparse	Medium	Dense	Sparse	Medium	Dense	Sparse	Medium	Dense	Sparse	Medium	Dense	Sparse	Medium	Dense
Feet	Pounds			Pounds			Pounds			Pounds			Pounds		
1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2
2	.2	.3	.4	.4	.3	.3	.4	.4	.5	.2	.2	.5	.3	.4	.5
3	.4	.6	.9	.7	.6	.7	.6	.7	.9	.4	.5	1.0	.7	.9	1.4
4	.6	1.1	1.5	1.0	1.0	1.2	1.0	1.1	1.5	.7	.8	1.6	1.2	1.6	2.4
5	.9	1.6	2.1	1.3	1.4	1.9	1.3	1.6	2.1	1.0	1.3	2.2	1.8	2.6	3.8
6	1.3	2.1	3.1	1.6	1.9	2.7	1.7	2.1	2.7	1.4	1.8	2.9	2.7	3.7	5.4
7	1.6	2.8	4.0	1.9	2.5	3.6	2.1	2.6	3.5	1.7	2.4	3.8	3.6	5.0	7.4
8	2.0	3.5	5.1	2.3	3.1	4.7	2.6	3.2	4.3	2.2	3.1	4.6	4.7	6.5	9.6
9	2.5	4.3	6.3	2.6	3.8	5.9	3.1	3.9	5.1	2.6	3.8	5.6	6.0	8.2	12.2
10	3.0	5.2	7.6	2.9	4.6	7.2	3.6	4.6	6.0	3.1	4.6	6.6	7.4	10.1	15.1
11	3.5	6.2	9.0	3.3	5.4	8.6	4.1	5.3	7.0	3.6	5.5	7.6	9.0	12.1	18.2
12	4.0	7.2	10.5	3.6	6.2	10.2	4.7	6.1	8.0	4.2	6.5	8.8	10.7	14.4	21.7
13	4.6	8.3	12.1	4.0	7.2	11.9	5.2	6.9	9.1	4.7	7.6	9.9	12.6	16.9	25.5
14	5.2	9.4	13.9	4.4	8.1	13.7	5.8	7.8	10.2	5.3	8.7	11.2	14.6	19.5	29.6
15	5.9	10.6	15.6	4.7	9.1	15.6	6.5	8.7	11.3	6.0	9.9	12.4	16.7	22.4	33.9
16	6.5	11.9	17.5	5.1	10.2	17.7	7.1	9.6	12.5	6.6	11.1	13.8	19.0	25.5	38.6
17	7.2	13.2	19.4	5.5	11.3	19.9	7.8	10.5	13.7	7.3	12.4	15.1	21.5	28.7	43.6
18	8.0	14.6	21.5	5.8	12.4	22.2	8.4	11.5	15.0	8.0	13.8	16.6	24.1	32.1	48.9
19	8.7	16.1	23.7	6.2	13.6	24.6	9.1	12.5	16.3	8.7	15.3	18.0	26.9	35.5	54.5
20	9.5	17.6	26.0	6.6	14.8	27.2	9.8	13.6	17.6	9.5	16.8	19.6	29.8	39.5	60.4

Exhibit 606.5(e)

Exhibit 703

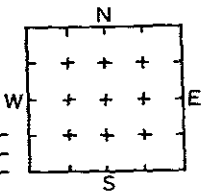
PRODUCTION AND COMPOSITION RECORD FOR NATIVE GRAZING LANDS

NRH-1, July 13, 1976

SCS RANGE 417
REV. 1-1-75

PRODUCTION AND COMPOSITION RECORD FOR NATIVE GRAZING LANDS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



SEC _____
TWP _____
RNG _____

DATE _____ COUNTY _____ STATE _____ LOCATION _____

DATA BY _____

	SAMPLE NUMBER				DATE	MAJOR LAND RESOURCE AREA		LAND SURVEY			N. LATITUDE			W. LONGITUDE			SOIL SURVEY SAMPLE NUMBER		CARD ID.
	ID NO.	YR	ST.	CNTY		NUMBER	SUBDIV.	S	TWP	RNG	DEG	MIN	SEC	DEG	MIN	SEC			
LØCATIØN																			
	KIND OF LAND	USE HISTORY	KIND OF ANIMAL	SEASON OF USE	SITE COND	BURNING	BRUSH MANGT.	ELEV	EXPOS	SLOPE	PRECIP	GROW SEASON	CRYPT	CARD ID.					
SITE																			
	SOIL TAXON						DETAILED PROFILE DESCRIP.							CARD ID.					
	SOIL SERIES NAME				MODIFIER	TEXTURE	Y or N												
SØIL																			
	WEIGHT	MEAS.	PLOT SIZE & SHAPE		CONV. FACT.	CLIPPED PLOTS	CANOPY	OVERSTORY SPECIES			DETAILED OVER-STORY DESCRIP. Y or N	TOTAL NO. OF PLOTS SAMPLED	CARD ID.						
MEASURE																			
REMARKS 1																			
REMARKS 2																			
REMARKS 3																			

NOTES: Cooperator- SWCD- Field Office- Area-

Vegetation Type (Kuchler)- Site Name- Site Number-

Soil Classification (Subgroup & Family)-

Current Season Precipitation- Vigor-

NRH-1, July 13, 1976

Exhibit 703

CODES TO BE USED ON SCS-RANGE-417

refer to Section 700-National Range Handbook for detailed instructions.

Location Data Line

Sample Number:
- ID No.–enter number, one to three digit (1-999)
- Yr–enter last two digits of the year
- St and Cnty–enter FIPS numerical code for state and county (same as timekeeping code numbers).

Date: enter month and day in numeric form (1102 = November 2)

MLRA: enter number and subdivision, if any

Land Survey: enter location to the Section, Township and Range as shown on 1:250,000 USGS Quad Maps.

N. Latitude-W. Longitude. enter latitude and longitude, rounded to show probable accuracy. This coordinate system must be used if Land Survey system -above- is not used.

Site Data Line

Kind of Land: enter code from following
- 1–Rangeland
- 2–Grazable woodland
- 3–Native pasture
- 4–Rangeland-formerly cultivated
- 5–Grazable Woodland-formerly cultivated
- 6–Nongrazable woodland-understory

Use History: enter code from following
- 1–None or slightly grazed
- 2–Properly grazed
- 3–Overgrazed
- 4–Harvested for hay
- —(dash)-history unknown

Kind of Animal: enter codes (up to 5 letters) to indicate kinds of grazing animals. List dominant first.
- A–antelope
- B–bison
- C–cattle
- D–deer
- E–elk
- G–goats
- H–horses and mules
- S–sheep
- O–other
- —(dash)-history unknown

Season of use: enter code from following (up to 4 digits)
- —(dash)-unknown
- 1–spring
- 2–summer
- 3–Fall
- 4–winter
- 5–specialized system
- 0–not grazed

Site Condition: (for rangeland only) % comp.-that is climax or potential. Dash for Grazable Woodland or Native Pasture.

Burning: enter code from following
- —(dash)-unknown
- 1–rarely, if ever, burned
- 2–occasionally burned
- 3–systematically burned

Brush Management: enter code from following
- —(dash)-unknown
- 1–none
- 2–within past year
- 3–within past 5 years
- 4–within past 10 years
- 5–more than 10 years ago

Elev: enter rounded to the nearest 100 feet

Expos: enter dominant exposure from following code
- NW–northwest
- N –north
- NE–northeast
- E –east
- SE–southeast
- S –south
- SW–southwest
- W –west
- NS–not significant

Slope: enter slope to nearest 1%

Precip: enter average annual precipitation to the nearest whole inch.

Growing Season: rate growing season from following code
- 1–unusually good
- 2–above average
- 3–average
- 4–below average
- 5–unusually poor

Crypt: code cryptogam cover as follows
- High
- Med.
- Low

Soil Data Line

Soil Series Name: enter full name

Texture, modifier enter code below, if applicable

BY	bouldery	GRV	very gravelly
BYV	very bouldery	MK	mucky
CB	cobbly	PT	Peaty
CBV	very cobbly	SH	shaley
CN	channery	ST	stony or
CNV	very channery	STV	very stony
CR	cherty	STX	extremely stony
CRV	very cherty	SY	slaty
CY	cindery		
CYV	very cindery		
FL	flaggy		
FLV	very flaggy		
GR	gravelly		

Texture, type. enter code from below

G	gravel	VFSL	very fine sandy loam
S	sand	L	loam
CØS	coarse sand	SIL	silt loam
FS	fine sand	SI	silt
VFS	very fine sand	SCL	sandy clay loam
LCØS	loamy coarse sand	CL	clay loam
LS	loamy sand	SICL	silty clay loam
LFS	loamy fine sand	SC	sandy clay
LVFS	loamy very fine sand	C	clay
CØSL	coarse sandy loam	SIC	silty clay
SL	sandy loam	MUCK	muck
FSL	fine sandy loam	PEAT	peat
		MPT	mucky peat

Detailed Profile Description: enter Y, if complete and suitable description available; N, if not so.

Measure Data Line

Weight: enter appropriate code for plot weights
- 1–fresh (green) weights
- 2–air-dry weights
- 3-oven dry weights

Meas: enter code for measurement system used
- M–metric system (kg/hectare or gm/m)
- E–English system (pounds/acre)

Plot size and shape: enter plot size in total area per plot (sq ft or sq m) and shape by the following code. Convert acres to sq ft.
- C–circular
- S–square
- R–rectangular

if only one plot size and shape used enter on right half of block; if two plot sizes used, enter one on left half of data block and one on right half.

Conv Fact: enter conversion factor to convert grams per plot to pounds per acre or kilograms per hectare. Follow instructions in range handbook. Leave blank if values in plot columns are shown as pounds per acre or kilograms/hectare.

Clipped Plots: enter no. of all plots clipped. Show plot 10 as 0 (zero). Enter dash if no plots clipped.

Canopy: enter estimated percent shaded ground at midday, if applicable. Enter dash, if not applicable.

Detailed Overstory Description- enter Y if detailed information was taken, N, if not so.

Remarks Lines

Remarks: enter essential remarks only. If detailed overstory information recorded, identify plot number. Print letters between tick marks.

NRH-1, July 13, 1976

Exhibit 703 Continued

CHECKED BY- DATE FORWARDED- DATA IDENTIFICATION- CARD ID -

KEY PUNCH CONTROL

	1-6	7-12	13-17	18-22	23-27	28-32	33-37	38-42	43-47	48-52	53-57	63-67	68 72		73-75
PLANT NAME	PLANT SYMBOL	PLANT CHAR.	ESTIMATED OR CLIPPED WEIGHT PER SPEC (CIRCLE PLOTS THAT ARE CLIPPED)									PPED PLOTS CLIP	PPED PLOTS DRY	PCF	% DRY WT
	(2)	(3)	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	P-9	(5)	(6)	(7)	(8)

INSTRUCTIONS AND CODES FOR ENTRIES ABOVE

Plant name (column 1): enter the scientific name of each species on any or all plots.

Plant symbol (column 2): enter from national list of scientific plant names. For groups of species use the following codes.

PPGG -Other perennial grasses
AAGG -Other annual grasses
PPFF -Other perennial forbs
AAFF -Other annual forbs
PPGL -Other perennial grass-likes
AAGL -Other annual grass-likes
HHSS -Other half-shrubs
SSSS -Other shrubs
TTTT -Other trees
UUUU -Unknown

Plant Char (column 3): enter the appropriate plant characteristic symbol for each species from NLSPN. (follow special instructions in range handbook.)

Plots (columns P-1 through P-10): enter weight in grams per species or group or pounds per acre or kilograms per hectare. Show trace amounts of species by entering a "T" in the plots where trace occurs (see special instructions in range handbook).

Wt. Clipped Plots (columns 4,5 and 6): columns to be completed if "double sampling" procedures are used for data collection.

Est (column 4): enter total estimated weight by species for all clipped plots. Not for computer processing.

Clip (column 5): enter total harvested weight by species from plots that are clipped.

Dry (column 6): enter the actual total air-dry weight of all species from plots that are clipped. Use only if clipped material is air dried.

PCF (5÷4) (column 7): plot correction factor obtained by dividing column 5 by column 4. Not for computer processing.

% Dry Wt (column 8): enter the percent dry weight used to convert fresh weight to air-dry weight.

Wt all plots (column 9): enter the total weight for each species from all plots. Not for computer processing.

Avg Yield and PCT COMP (columns 10 and 11): Compute as air dry weight in pounds per acre or kilograms per hectare. Not for computer processing.

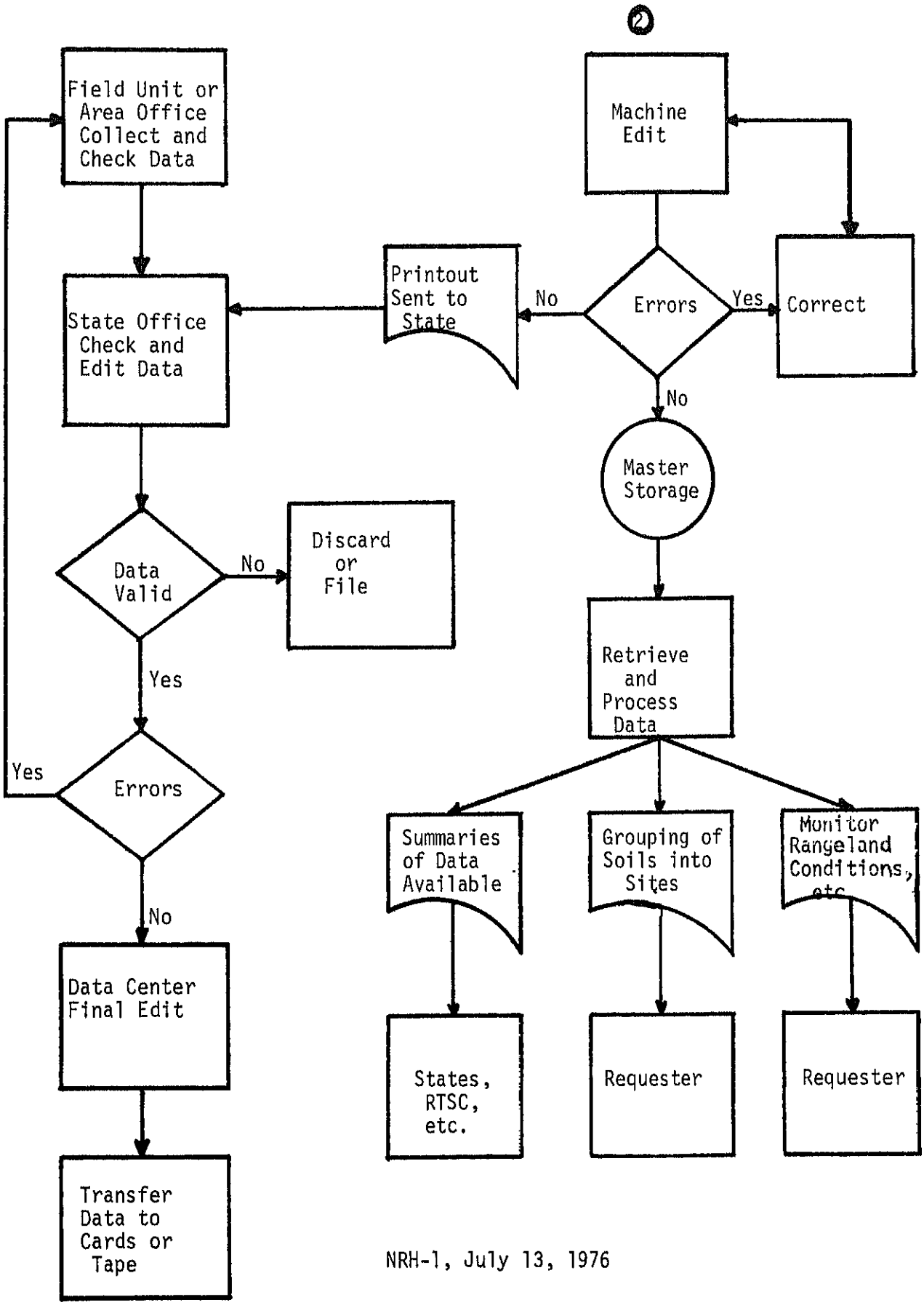
Residues (Mulch): enter weight of mulch in each plot. Use same sampling techniques as for species; if "double plot" technique, gather and weigh mulch in clipped plots.

% cover (cover): Estimate and enter crown cover up to 4½ feet above ground.

% bareground (bare): estimate and enter percent of area in each plot that has bare soil exposed, do not include area covered by mulch or stones.

% rock cover (rock): estimate and enter for each plot the percent of area covered by rock, stones or gravel.

FLOW CHART FOR PROCESSING PRODUCTION AND COMPOSITION DATA



(Exhibits will be distributed by Handbook Notice)

HOW TO TIE LIVESTOCK MANAGEMENT INTO A GRAZABLE WOODLAND OR RANGE CONSERVATION PROGRAM
For Greatest Net Returns Per Animal Unit

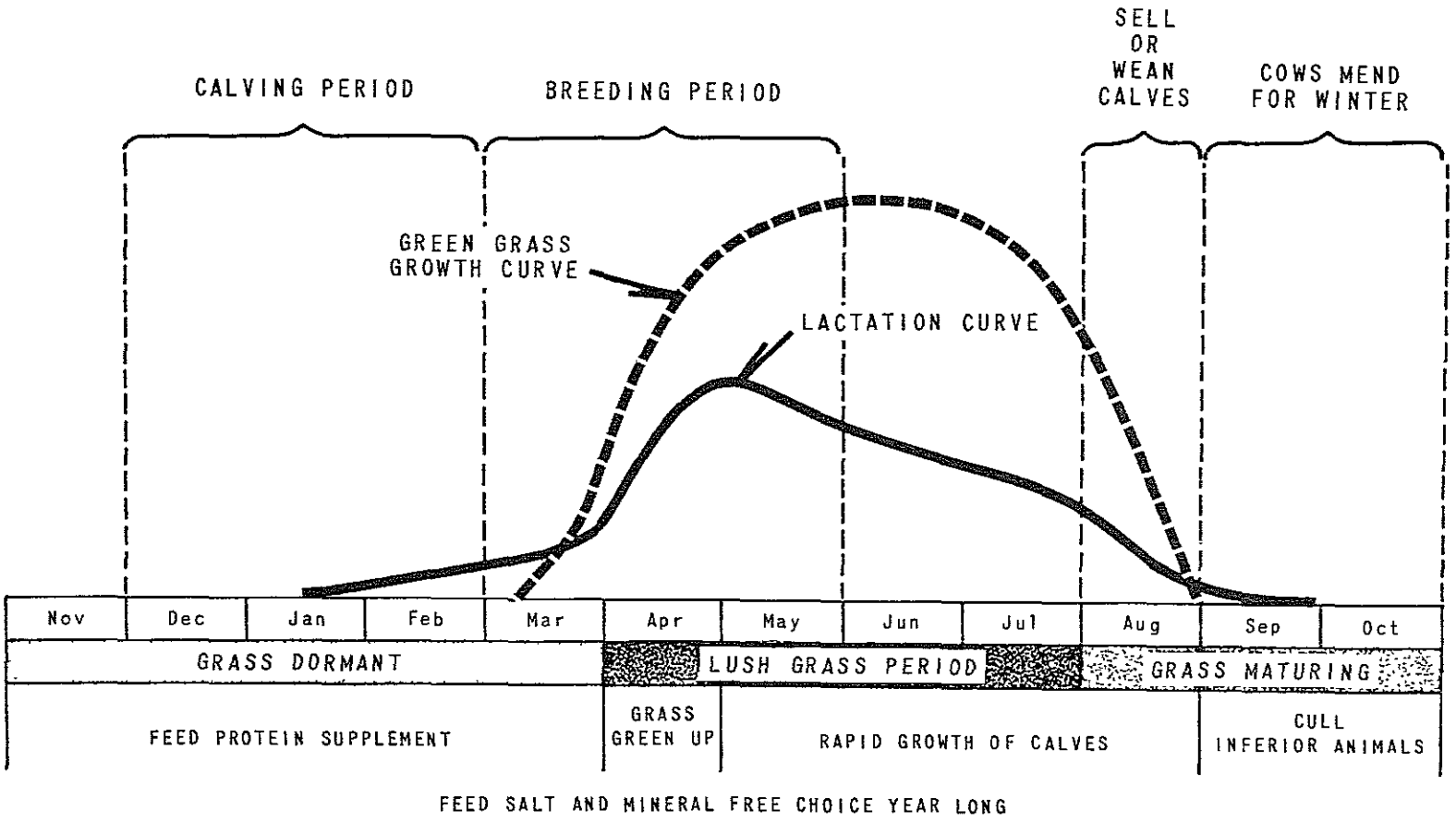


Exhibit 806.1

U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, Fort Worth, Texas 5-65 4-R-20100

IRH-1. July 13, 1976

SCS-RANGE-414
Rev. 10-70
File Code RANGE-16

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROPER GRAZING USE

COOPERATOR ____________________

GRAZING UNIT	ACRES	SPECIES OF GRAZING ANIMAL	SEASON OF USE	LOCATION OF KEY GRAZING AREA	KEY PLANT(S) FOR JUDGING PROPER GRAZING USE	PLANNED USE OF KEY SPECIES AT END OF GRAZING PERIOD	ESTIMATED USE OF KEY SPECIES BY WEIGHT				
							19__	19__	19__	19__	19__
Conservationist Assisting with Planning						Initials of Conservationist Assisting with Application					
						Dates of Application Checks					

____
NAME AND DATE

INSTRUCTIONS

PROPER GRAZING USE

Grazing Unit: Enter in this column the name of the pasture or field used by the cooperator or the number from the conservation plan map.

Acres: Enter in this column the acreage of the grazing unit.

Species of Grazing Animal: Enter in this column the species and class of livestock being grazed such as: dry cows, cow-calves, ewes and lambs, yearling cattle, 2-year steers, yearling sheep, goats, deer, horses, elk, etc.

Season of Use: Enter in this column the season that unit will be grazed such as: Fall, Winter, Spring, Summer, or by months: September-October, November-March, May-July, etc.

Location of Key Grazing Area: Enter in this column a description of the key grazing area. This may be a range site or it may be a portion of a site or it might be a particular location within the grazing unit such as: S-W portion of grazing unit starting about 200 yards from pond to fence.

Key Plant(s) for Judging Proper Grazing Use: Enter in this column the species by common name on which you and the cooperator decide proper grazing use will be judged. There may be occasion when you will select two species, in this case enter the name of both species.

Planned Use of Key Species at End of Grazing Period: Enter in this column the percent by weight of the current year's growth of the key species that should be left ungrazed at the end of the grazing season. Where specification call for a certain number of pounds of forage to be left ungrazed per acre of the key species, then, the specified pounds per acre should be entered in this column.

Estimated Use of Key Species by Weight: Enter in this column by calender year the estimate of the actual use the grazing unit received. This estimate should be based on the key species on the key grazing area, at or near the end of the grazing period or on year-long grazing just prior to the next growing season. If specification calls for use in percent of current year's growth, enter percentage of growth actually left ungrazed. If use is specified in amount of forage to be left ungrazed in pounds per acre then enter pounds per acre left ungrazed. Actual use estimates are more meaningful when made jointly by the cooperator and conservationist.

SCS-RANGE-416
REV. 4-72

U. S. Department of Agriculture
Soil Conservation Service

JUDGING UTILIZATION, TREND, AND CONDITION OF BROWSE PLANTS

Name of Ranch _____ Location _____
Range Site(s) _____ Date _____ Examiner _____

UTILIZATION OF CURRENT GROWTH

Key Grazing Area	Key Species	Season of Use	Percent Use of Key Species

CHECKING TREND AND CONDITION OF BROWSE PLANTS

	Key Species			Low Quality Species		
Evidences of Past Year's Use						
Hedging (check one)						
Not evident						
Moderate						
Severe						
Browse line (check one)						
Not evident						
Moderate						
Very apparent						
Reproduction						
For key species (check one)						
Adequate				xxx	xxx	xxx
Some but inadequate				xxx	xxx	xxx
Little or none				xxx	xxx	xxx
For low quality species (check one)						
Excessive	xxx	xxx	xxx			
Adequate	xxx	xxx	xxx			
Little or none	xxx	xxx	xxx			

Report as "Proper Use" if utilization of current growth of key species is not in excess of 50 percent or less by weight during growing season, or 65 percent during dormant season.

NRH-1, July 13, 1976

Exhibit 1003.1(d)(5)

INSTRUCTIONS FOR JUDGING UTILIZATION OF BROWSE PLANTS

1. CURRENT GROWTH.

   A. Utilization during the growing season. Proper use is when 50 percent by weight or less of the available twigs, leaves, and fruits have been removed during the growing season or 65% during the dormant season (twigs).

   B. Utilization during the dormant season. Proper use is when 65 percent or less of available twigs of deciduous species, or twigs and leaves of evergreen species have been removed.

   (NOTE: These percentages should be used unless local research indicates otherwise. The above percentages are on the basis of weight of current year's growth as determined by ocular estimates or a combination of harvest and estimates.)

CHECKING TREND AND CONDITION OF BROWSE PLANTS

1. EVIDENCES OF PAST YEAR'S USE.

   A. Hedging. Three categories as follows:

Not evident	Little or no evidence of hedging of plants.
Moderate	Up to half of the plants plainly show evidence of hedging.
Severe	More than half of the plants plainly show evidence of hedging.

   B. Browse Line. Three categories as follows:

Not evident	No browse line distinguishable from a distance. Production on lower twigs similar to that of twigs beyond reach of animals.
Moderate	Browse line apparent from a distance but lower twigs still reasonably productive.
Very apparent	Browse line strikingly evident. Little or no production on twigs within reach of animals.

2. REPRODUCTION. Three categories as follows:

   A. For key species:

Adequate:	Sufficient seedlings and young plants to maintain or increase status of species in the community.
Some but inadequate:	Some seedlings and young plants present but not enough to maintain status of species in the community.
Little or none:	The species is not reproducing. Plants mostly mature or decadent. Few or no seedlings or young plants.

   B. For low quality species:

Excessive:	More seedlings and young plants than required to maintain species in the community. Species obviously increasing.
Adequate:	Sufficient seedlings and young plants to approximately maintain status of species in the community. Population static.
Little or none:	Very few seedlings or young plants becoming established. Species is declining in the community.

FL-RANGE-3c
12-71

Exhibit 1104
U. S. DEPARTMENT OF AGRICULTUF
SOIL CONSERVATION SERVICE

ANNUAL COST-RETURNS
AMORTIZATION SCHEDULE 19 ____

Identification _____ Date _____

Conservation Practice	Initial Cost	Length of Life	Interest Rate	Amortization Factor	Annual Amortized Cost

WSDA-SCS-FORT WORTH, TEX.

NRH-1, July 13, 1976

SCS-CONS-2
REV. 1-74
(FILE CODE CONS-15)

FORM APPROVED
OMB NO. 40-R-3608
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Livestock Production from Properly Used Forage Resources under Conservation Treatment with Pertinent Associated Livestock Costs

I. IDENTIFICATION

Name of Producer	Address
Land Resource Area	Year of Record
Date Obtained	SCS Technician
Total Acres in Operating Unit	

II. LAND AND FORAGE RESOURCES

Native range sites or type of tame pasture	Condition or kind	Acreage or percent	Time Used
Annual Pasture			

Public Land (numbers)	Period of time
Acres hayland	Other forage (acres)
Acres aftermath grazing	Number of A.U.M's
Technician's evaluation of degree of use of current year's forage	
Percent range properly used	1st year _____ 2nd year _____ 3rd year _____

Exhibit 1105.2 Continued

III CONSERVATION TREATMENT APPLIED INCLUDING GRAZING SYSTEMS AND MANAGEMENT

IV. LIVESTOCK PRODUCTION*			
BASIC LIVESTOCK INFORMATION			
Total Number Animal Units			
Percent Calf Crop Weaned			
Average Age at Weaning			
Average Weight at Weaning			
Average Weight of Cull Cows			
Average Weight of Cull Bulls			
Average Weight of Steers Bought			
Average Weight of Steers Sold			
Death Loss (kind and number)			
NUMBER AND KINDS OF ANIMALS			
Cows			
Heifers (replacements)			
Calves (replacements)			
Bulls			
Horses			
Steers			
Livestock purchased, kind			
NUMBER OF ANIMALS SOLD			
Calves			
Cull Cows			
Cull Bulls			
Steers			
POUNDS OF LIVESTOCK SOLD			
Calves			
Cull Cows			
Cull Bulls			
Steers			
GROSS INCOME FROM LIVESTOCK (Dollars)			
Calves (At ¢ lb.)			
Cull Bulls (At ¢ lb.)			
Cull Cows (At ¢ lb.)			
Steers (At ¢ lb.)			
Gross income from Livestock			

* On sheep ranches insert ewes, lambs, rams, wool, etc., or equivalent for goats.

	Year 19 Dollars	Year____ Dollars	Year____ Dollars
V. ANNUAL FIXED COSTS			
Taxes on land and improvements			
Improvements, barns, sheds, etc.			
Fences, new			
Fences, old			
Water developments, new			
Water developments, old			
Roads and line lines			
Lane pastures			
Conservation treatment			
Grazing leases			
Miscellaneous			
Subtotal			
VI. LIVESTOCK COSTS			
a. Supplemental Feed & Costs			
Protein @ lb. per day for days			
Hay @ lb. per day for days			
Silage @ lb. per day for days			
b. Interest on investment in Livestock			
Cows %			
Heifers %			
Bulls %			
Calves %			
Steers %			
Horses %			
c. Labor			
d. Veterinary Expenses			
e. Miscellaneous Costs			
Transportation and Marketing			
Pickup and Other Equipment			
Taxes on Livestock			
Bull Replacement			
Salt and Minerals			
f. Other			
Subtotal Livestock Costs			
VII. SUMMARY			
Gross Income Sales			
Less Annual Fixed Costs			
Less Livestock Costs			
Ranch Net Return			
Per A.U. Cost Total Operation			
Per A.U. Net Return Total Operation			

Exhibit 1105.2 Continued

VIII. REMARKS AND MISCELLANEOUS DATA

IX. INSTRUCTIONS FOR COMPLETING FORM

1. Use form only on representative ranches where good livestock management and conservation treatmen are applied and where proper use has been achieved for the production year being reported. Form is designated to contain data for later years if continuing data would be desirable and cooperator is wi ing to make records available.

2. Production information should be based on records.

3. Under "Tame Pasture" include perennial irrigated as well as dryland pastures.

4. Indicate permitted numbers and length of time on public lands that are separate from home-based operations. Where public lands are fenced and managed within the boundaries of the regular operating unit, acreage should be included in total and also as part of the native range information.

5. Technician's evaluation of proper use should be determined on the basis of Standards and Specifications in the local Work Unit Technical Guides for native range, grazed woodlands, and tame pastures.

6. Livestock information should be inserted where the form does not provide for individual situations. Unusual variations in sales or purchases should also be noted.

7. Annual fixed costs – taxes on land shall include those on the range land–other crop and pasture land taxes are included as a part of the crop costs. The annual costs for capital improvements (fences, water developments etc.) include applicable amortization costs plus annual O & M.

8. Under "Remarks" record climatic or other unusual conditions that affected sales or production during the year being reported. Also include income from wildlife or recreation under "Remarks".

Exhibit 1105.4

FL-RANGE-3a
12-71

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ANNUAL COST-RETURNS
BASIC LIVESTOCK INFORMATION

Identification_____ Date_____

Average Weight Livestock Sold

Bulls_____ Yearling Heifers_____
Cows_____ % Calf Crop_____ Weaning Steers_____
Yearling Steers_____ Weaning Heifers_____

INVENTORY AND VALUE OF LIVESTOCK - FOR 19____

(1) KIND OF LIVESTOCK	(2) BEGINNING INVENTORY NO	(3) BEGINNING VALUE $	(4) INCREASE BORN OR BOUGHT	(5) PURCHASE COST $	(6) TOTAL NUMBER (2) + (4)	(7) DEATH LOSS NO.	(8) SALE NO.	(9) SALE WT	(10) SALE VALUE	(11) CARRY OVER (6) - (7&8) NO	(12) CARRY-OVER VALUE
Total											

RETURNS FROM LIVESTOCK

Total column (12) $_____
Minus column (3) $_____
Change Inventory (±) $_____

Column (10) $_____
Minus column (5) $_____
Gross Sales $_____
± Change Inventory $_____
Returns from Livestock $_____

SUMMARY

Total column (3&5) $_____
Times Interest Rate $_____
Interest on Livestock $_____

Returns $_____
Less Costs $_____
Returns to Operating Unit $_____

DUPLICATED FORT WORTH, TEX.

EXAMPLE OF LIVESTOCK, FORAGE, AND FEED WORKSHEET BALANCE SHEET

Name_____ SWCD_____ Acres_____

Livestock Inventory

Kind of Livestock	No.	AU Fac.	AU's	Total AUM's	AUM Needs by Seasons			
					Spring	Summer	Fall	Winter
Total Needs	XXX	XXXX						

Forage and Feed Inventory

Fd. No.	Acres	Kind of Forage or Feed	Ac. Yld.	AUM Fac.	Total AUM's	Availability by Seasons			
						Spring	Summer	Fall	Winter
Total Available			XXXX	XXXX					

Differences

Surplus or Deficiency	Total AUM's	Spring	Summer	Fall	Winter

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